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# Gas Journal

Vol. 268. 103rd Year. LONDON, NOVEMBER 28, 1951. No. 4617. Price 1/3

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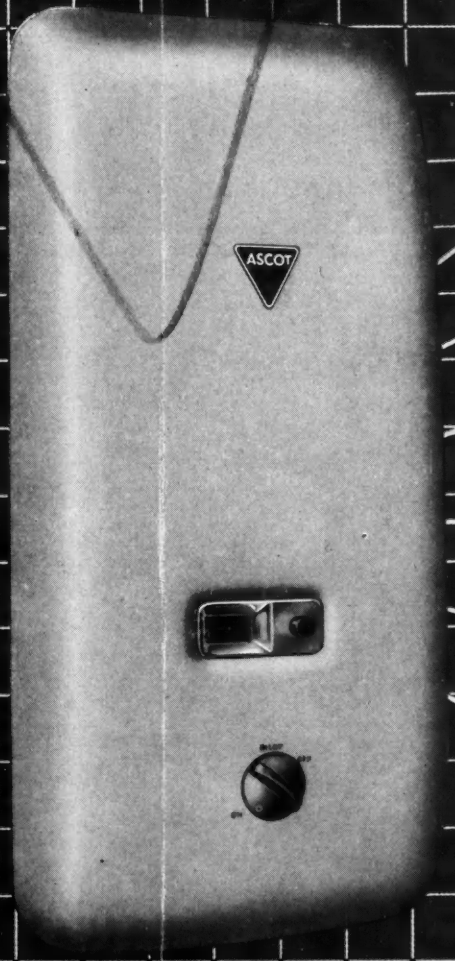
GAS WATER HEATER

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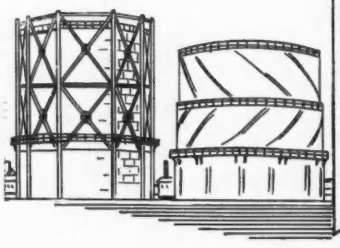

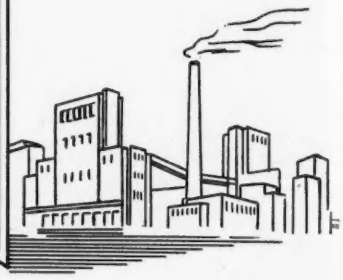

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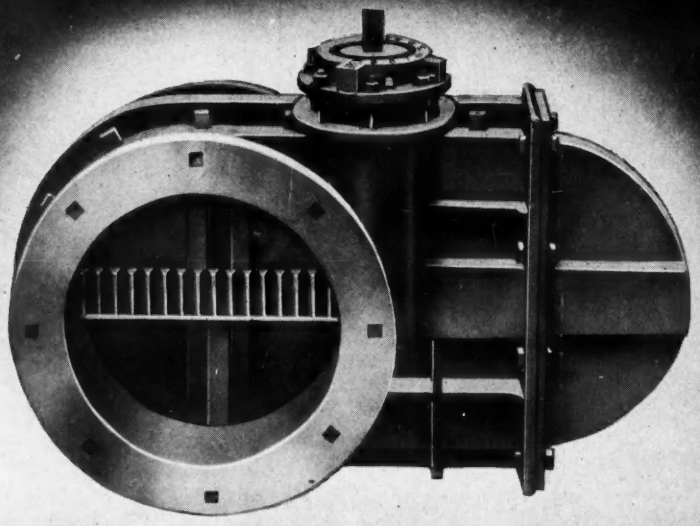

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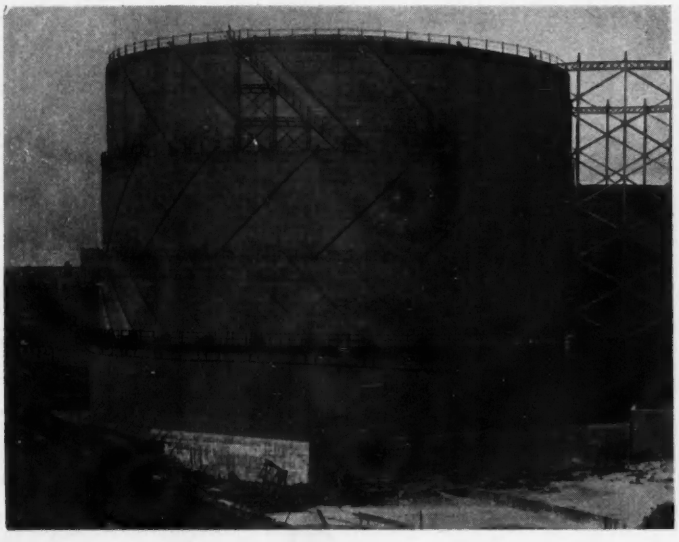

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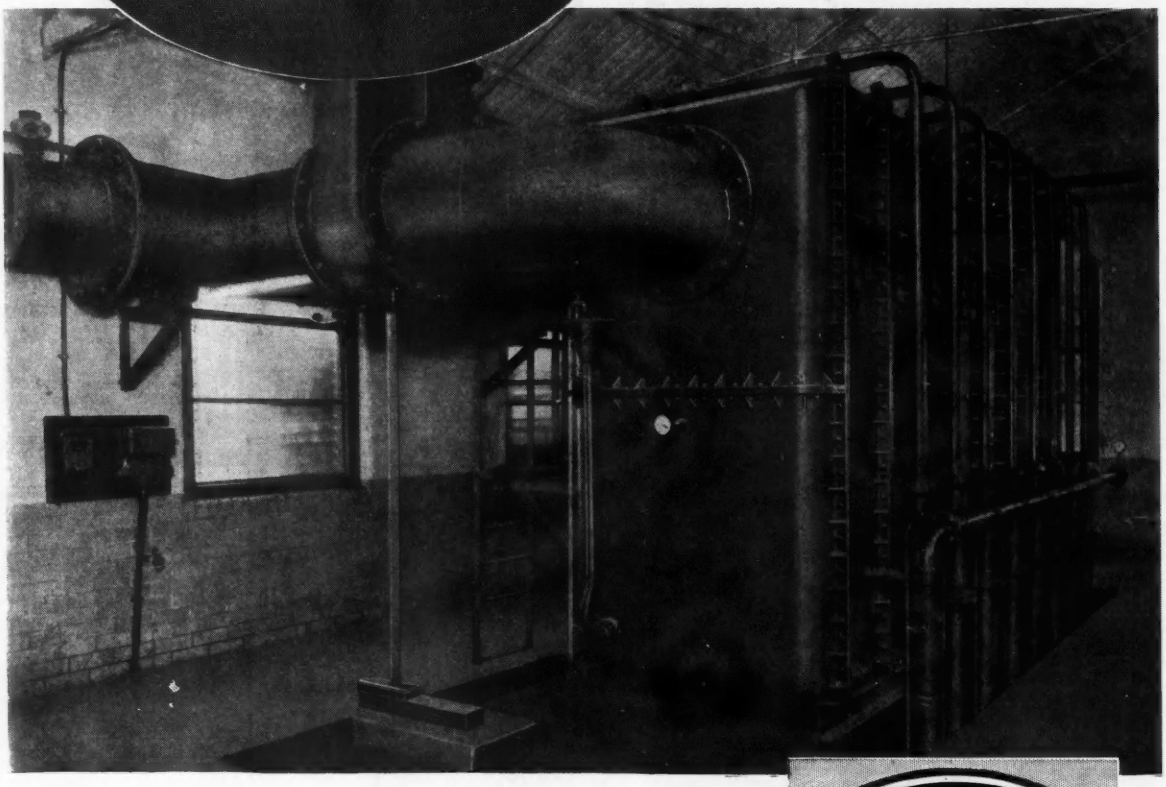

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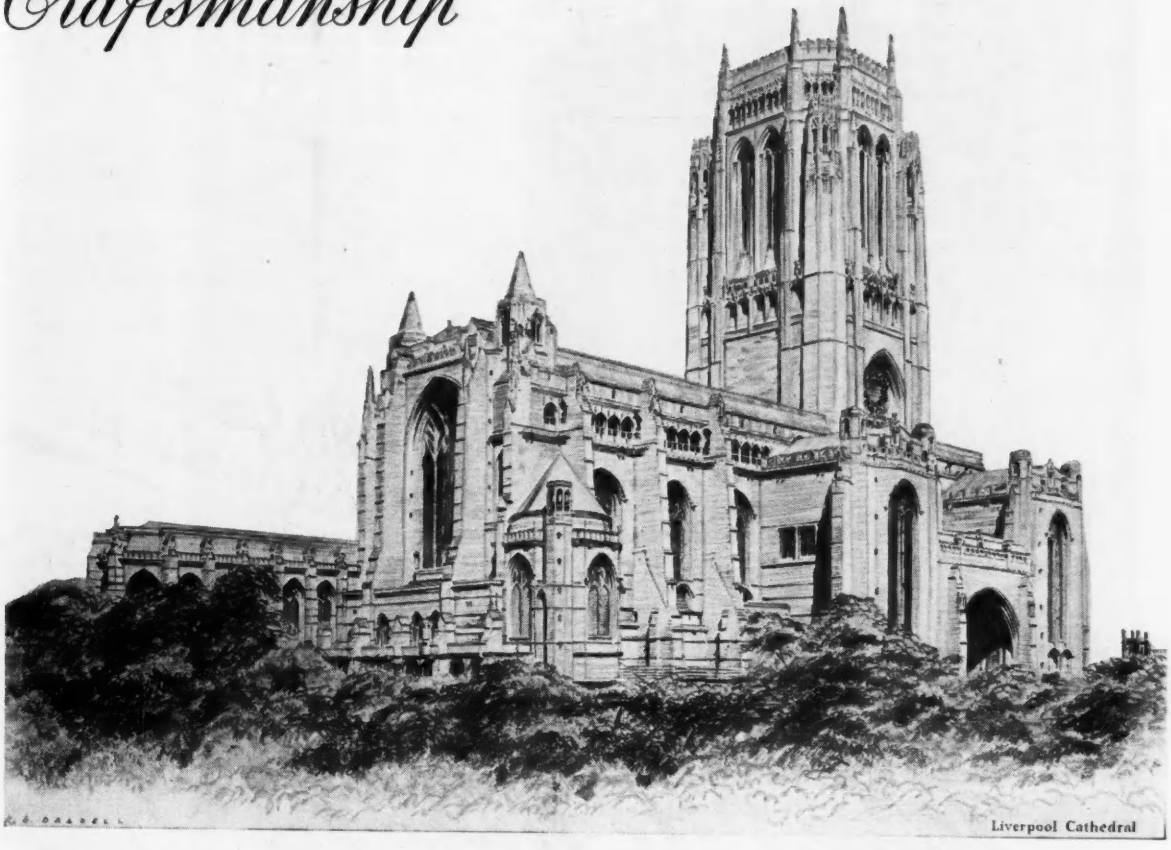

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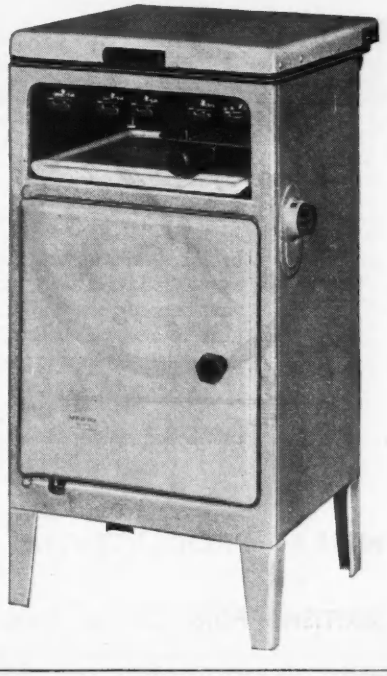

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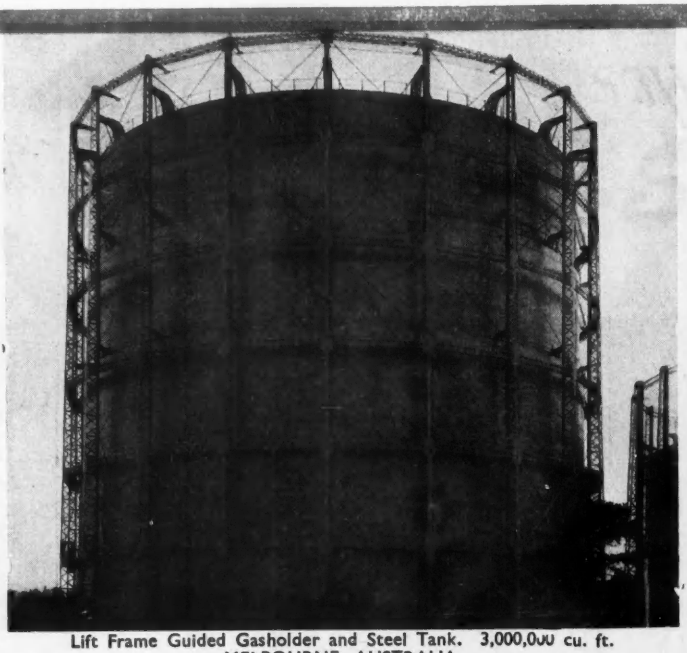

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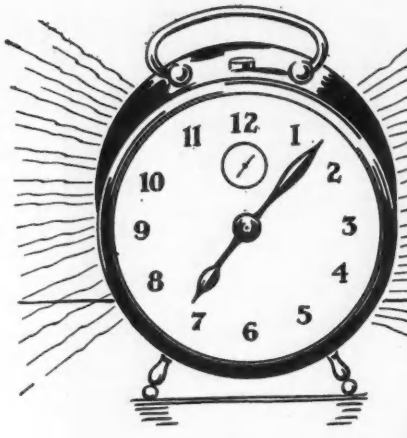


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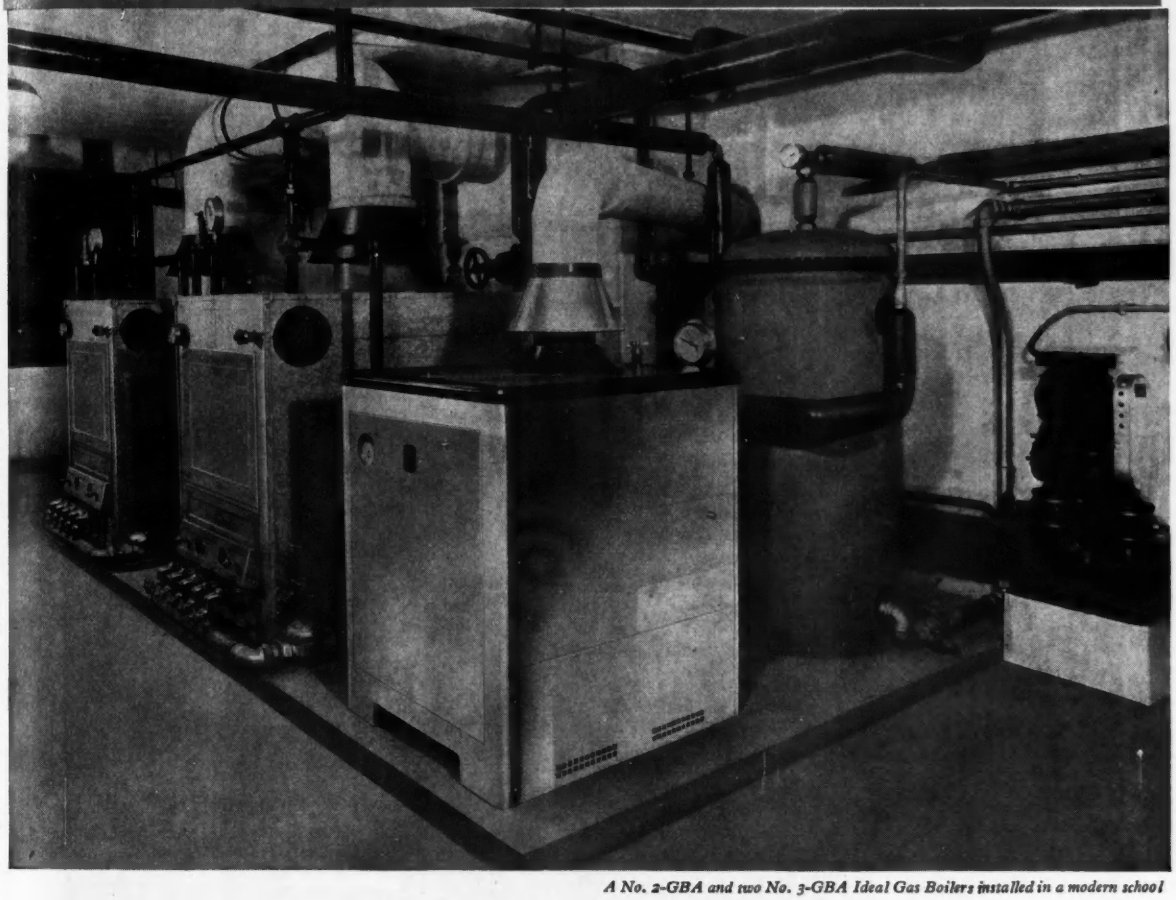

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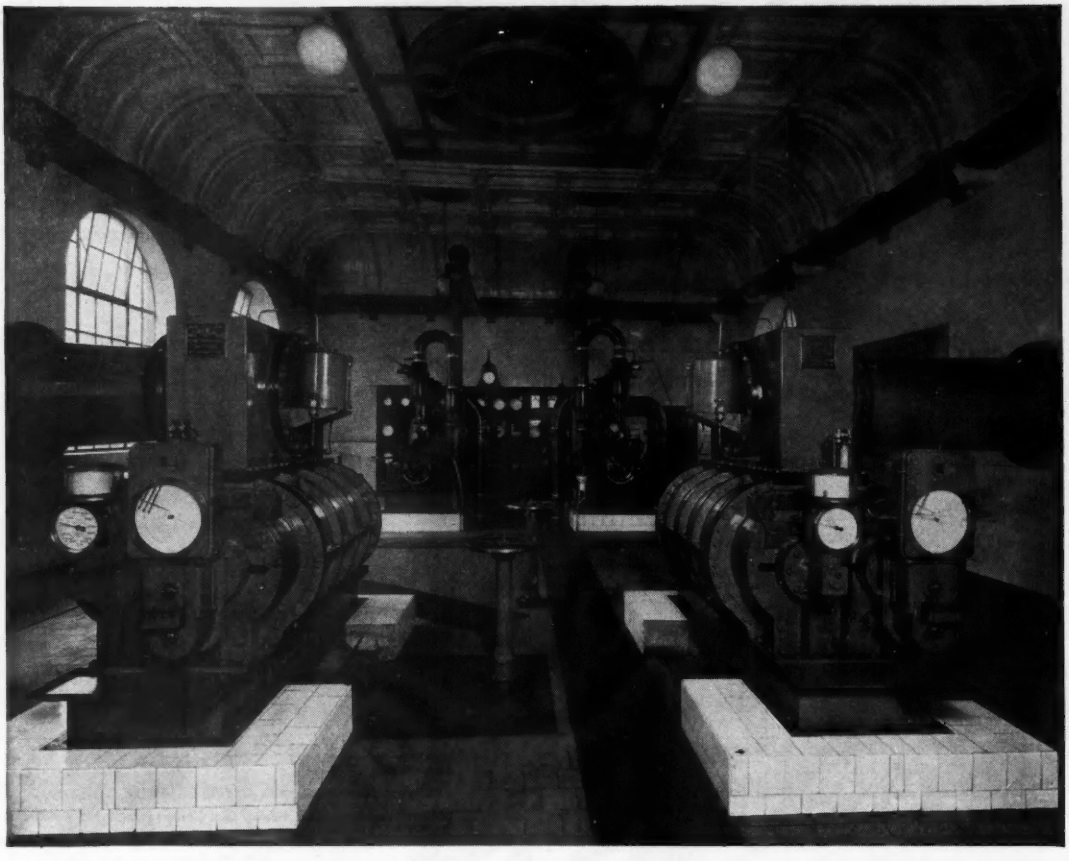

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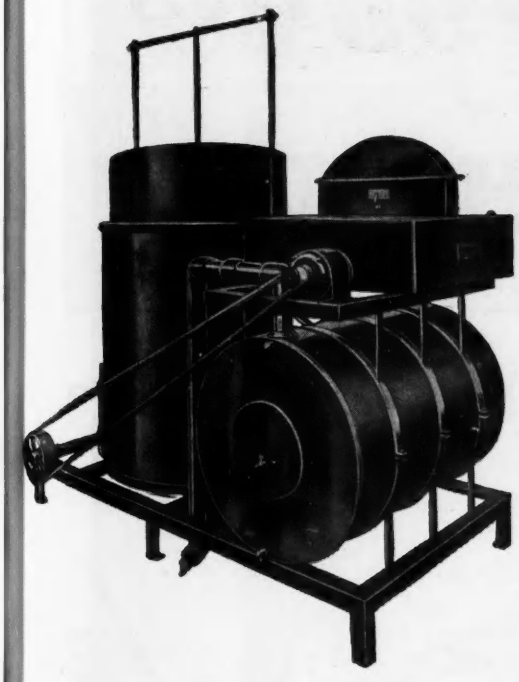

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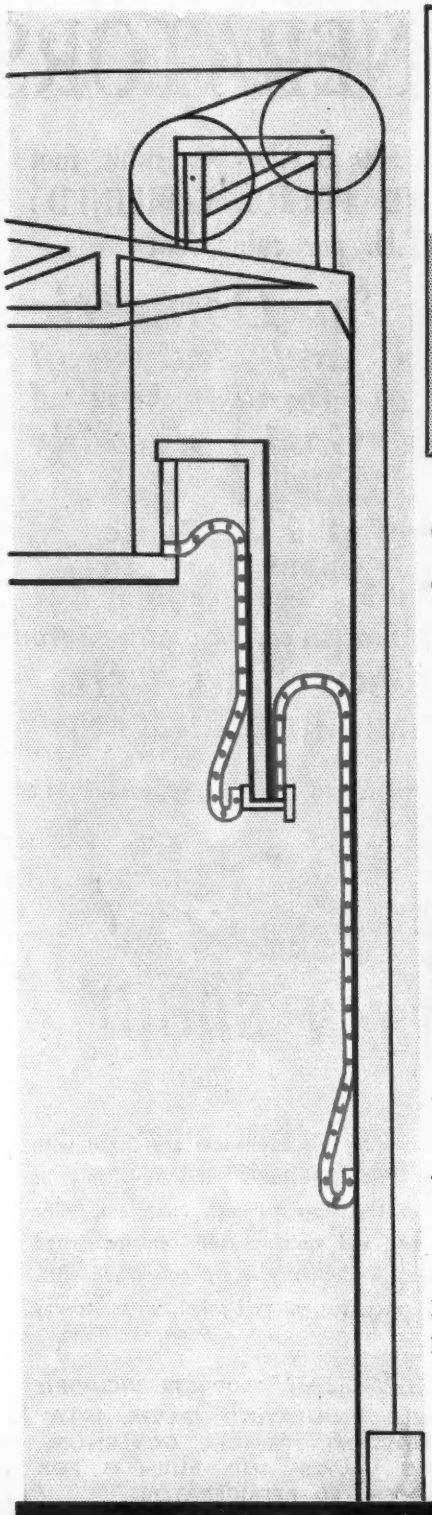

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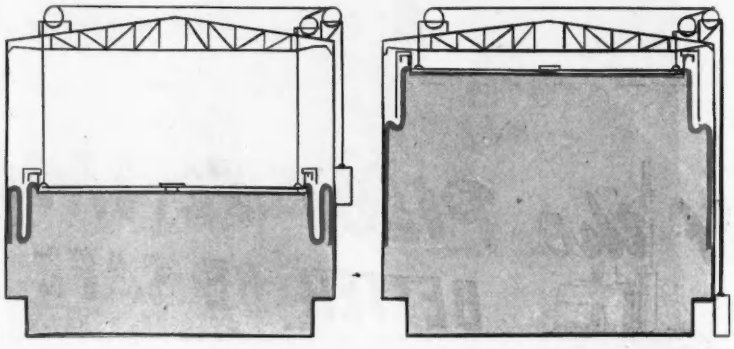

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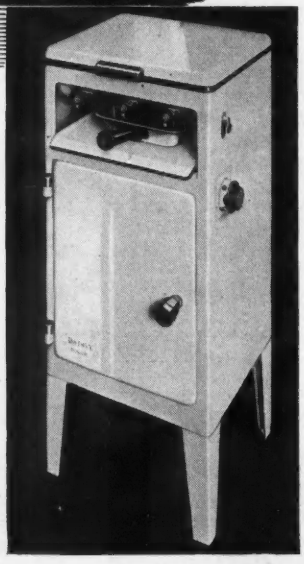

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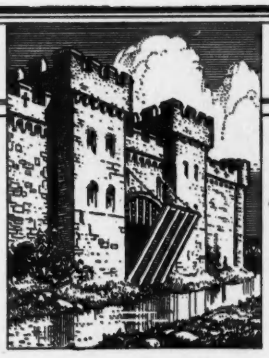

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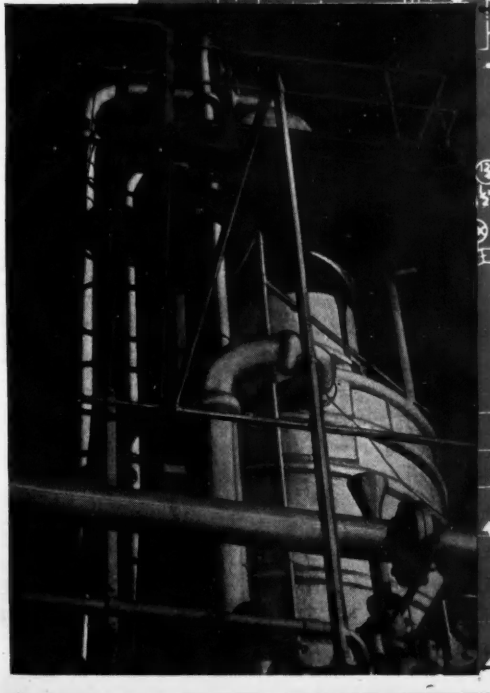

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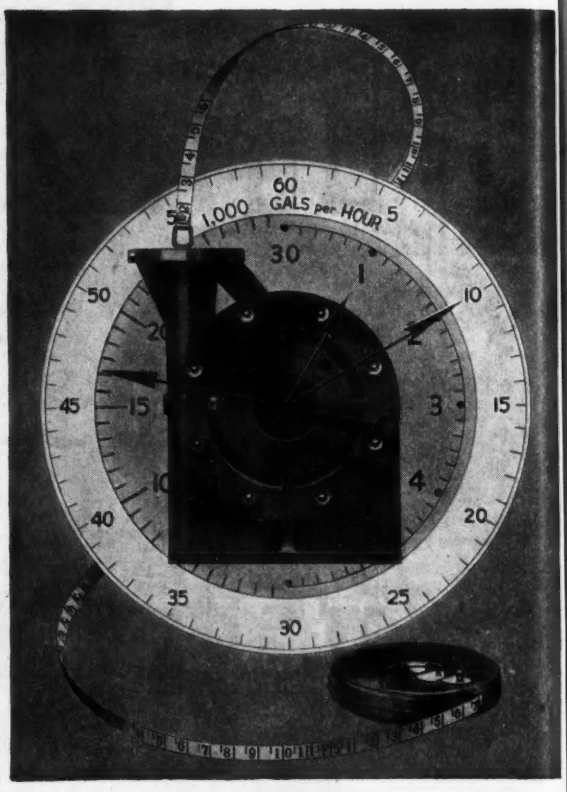


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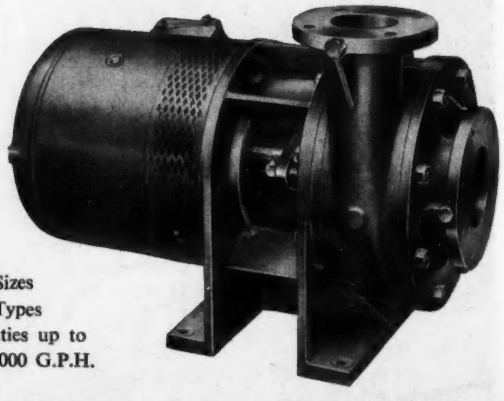

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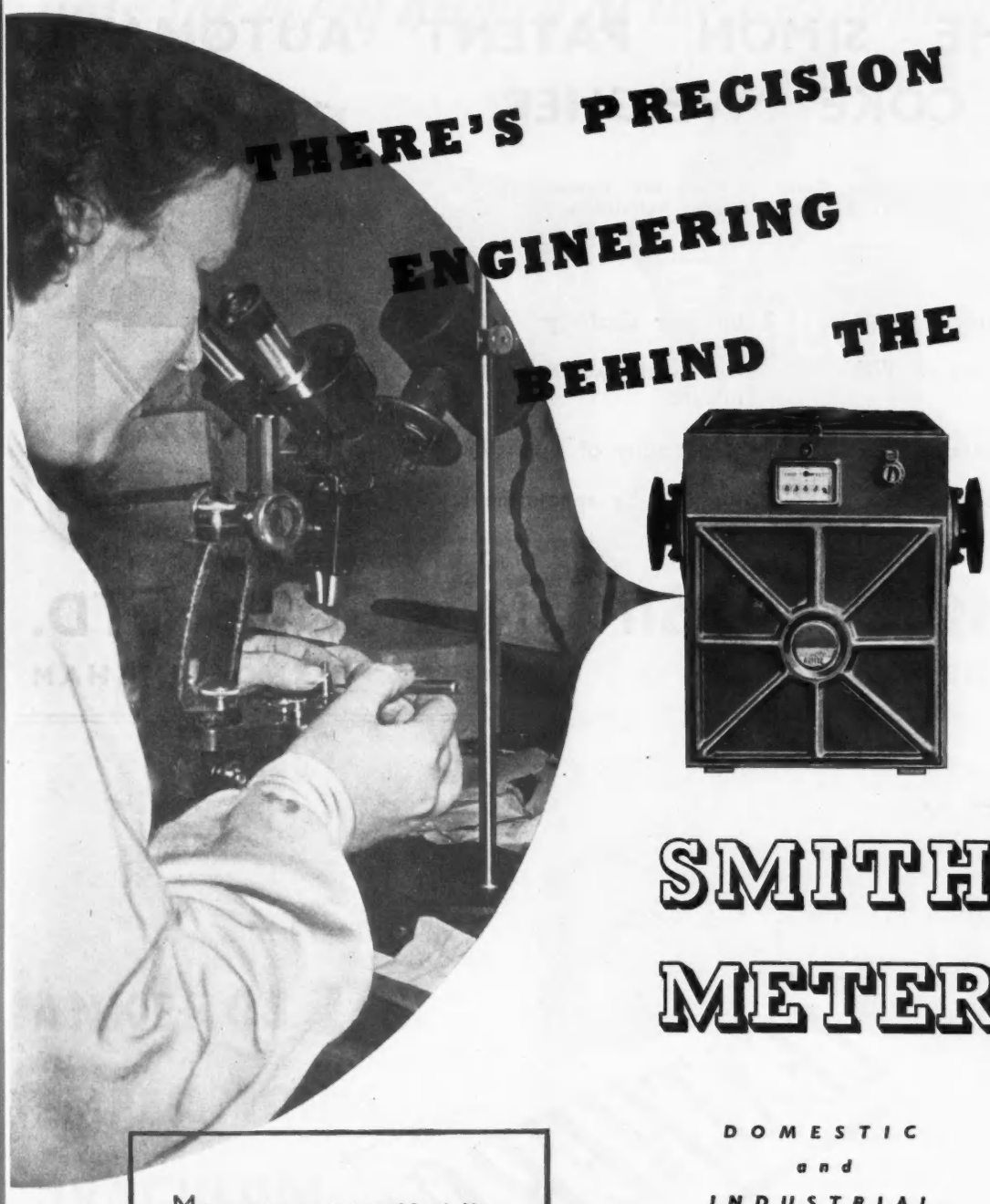



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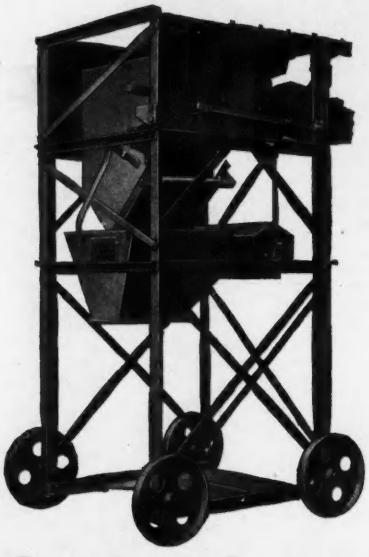

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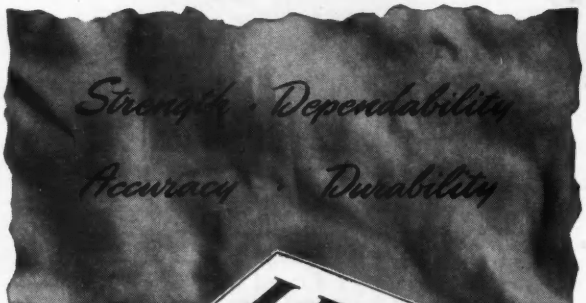


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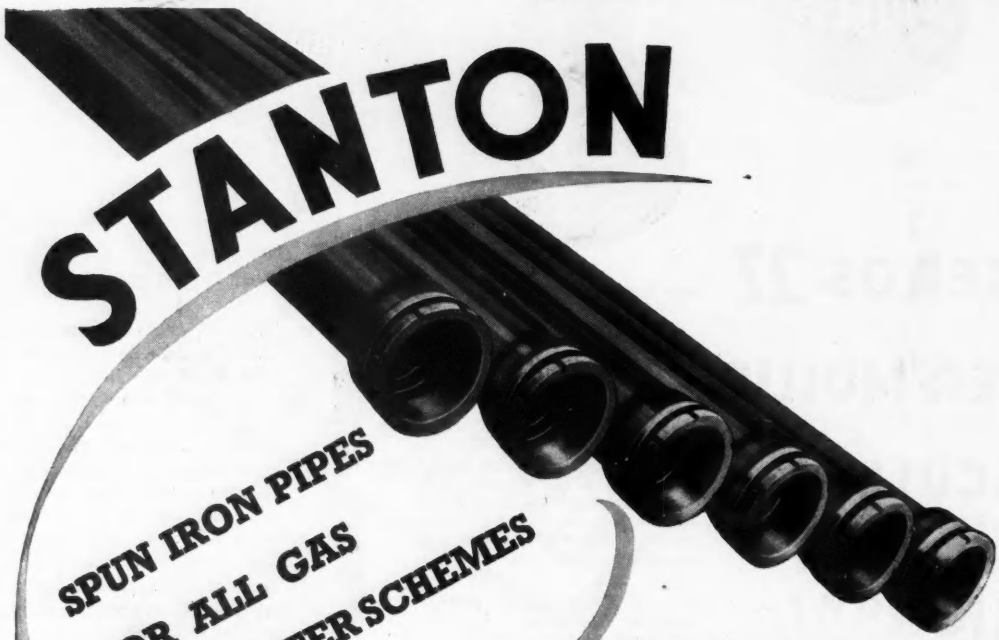

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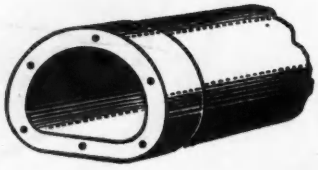

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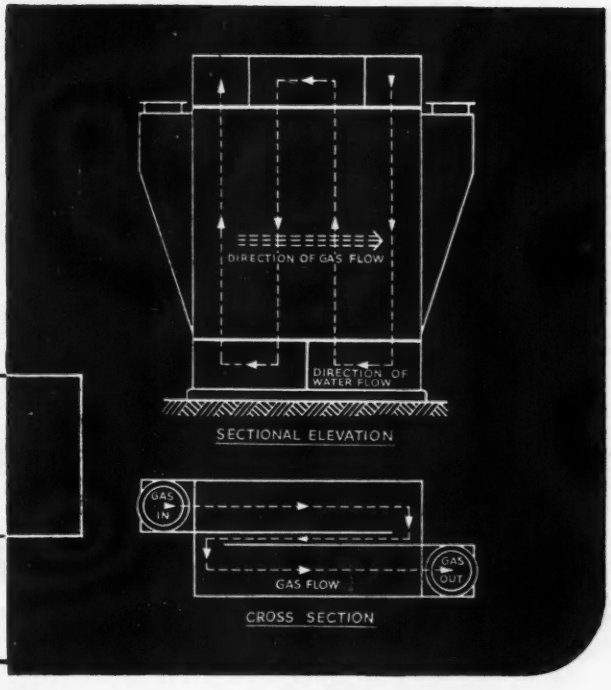


*Diagrammatic arrangement of a Whessoe vertical tube horizontal gas flow condenser.*

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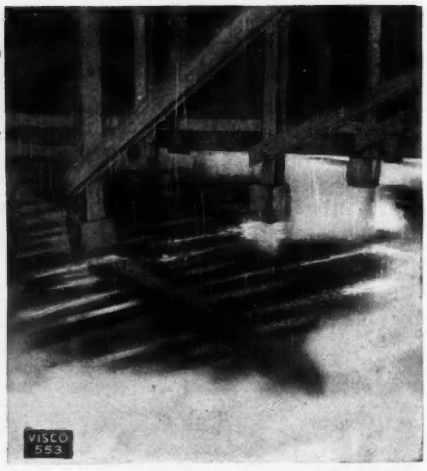


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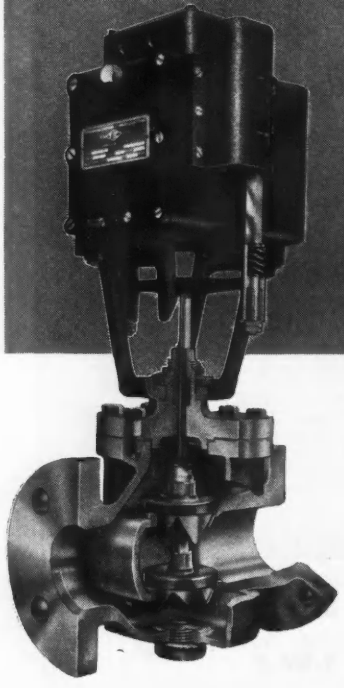

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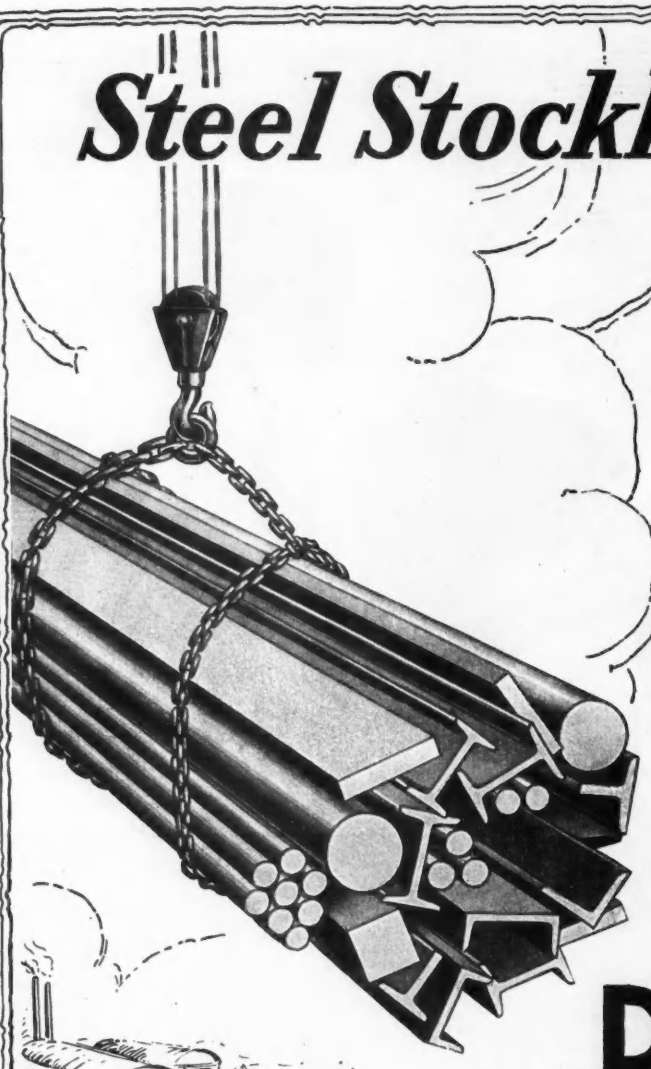

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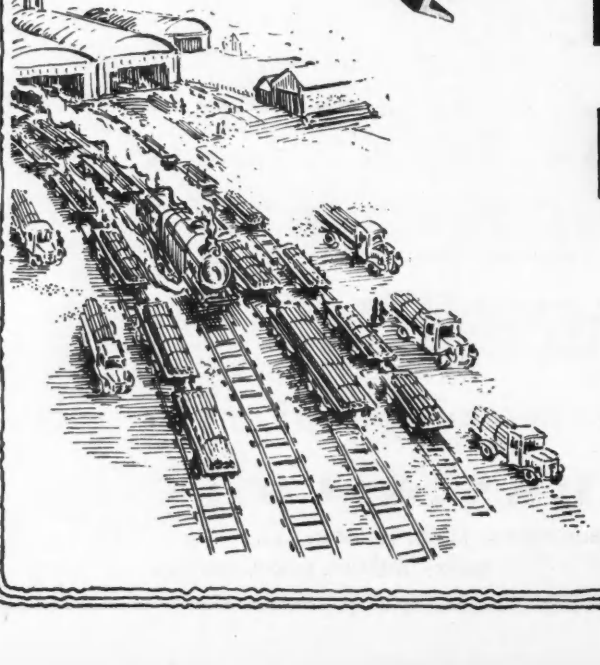

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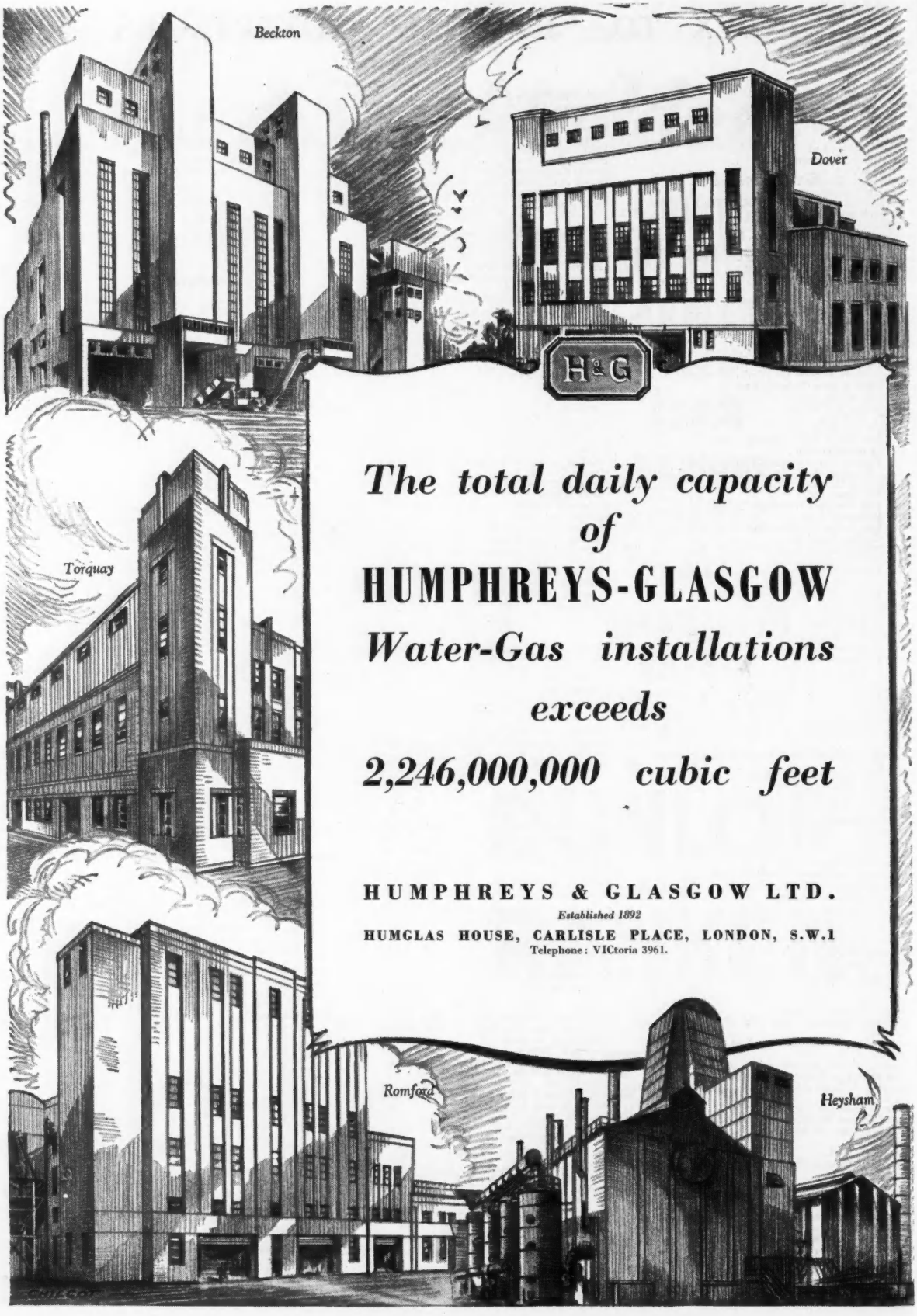


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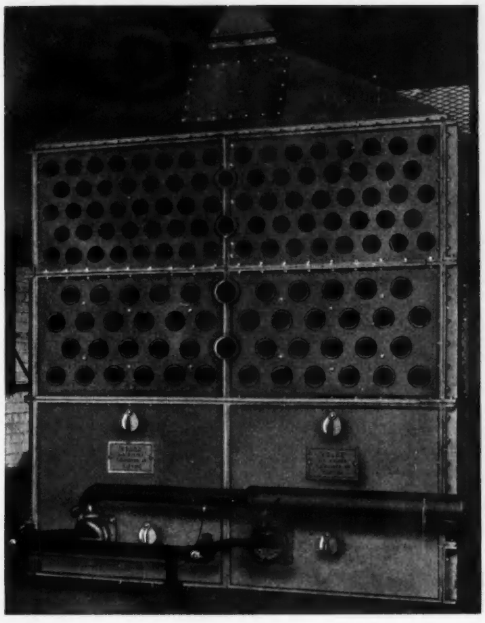

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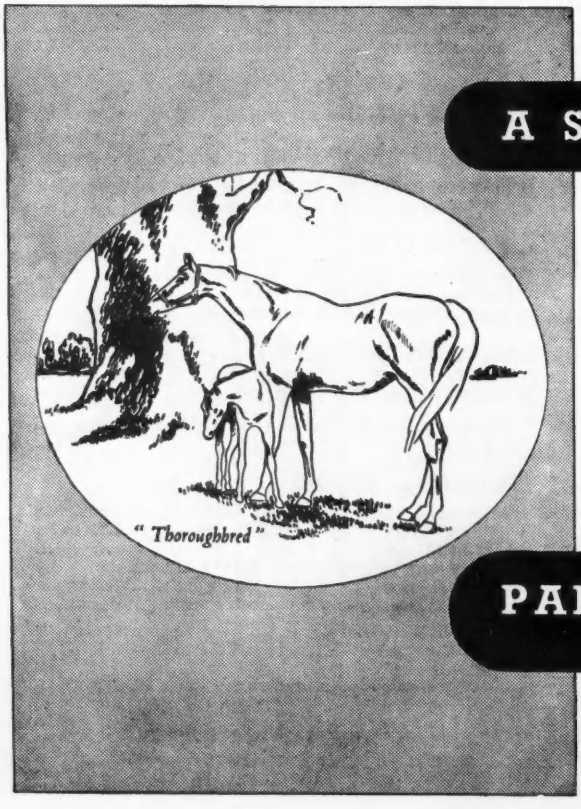


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VOL. 268. NO. 4617 103RD YEAR NOVEMBER 28, 1951

## TRAINING AND PROMOTION

DURING the early stage of its enquiry into the nationalised industries the Acton Society Trust, to several of whose publications we have referred in recent months, formed a study group comprising members of the personnel departments of the various nationalised industries, trade unionists, personnel officers from large-scale private undertakings, research workers, and others. The group, which aided the Trust's research staff by comparison of experience and practice and by debating underlying principles of policy, at the close of its labours urged on the Trust the publication of a factual account of the practices discovered, with some discussion of the problems behind those practices. The result was the publication on November 15 of *Training and Promotion in Nationalised Industry* (George Allen and Unwin, Ltd., 10s. 6d.) which, it should be noted, is distinct from the series of research papers dealing with particular aspects of the nationalised industries. It is an impartial description and discussion of three aspects of the personnel policies which are being developed by the coal, transport, electricity, and gas industries—all nationalised since 1945—namely, training, promotion, and the organisation of the personnel department. For the rank and file of workers nationalisation meant not so much the possibility of a more efficiently co-ordinated industry, not so much the end of private profit, as the dawn of a new era of opportunity and the placing of the day-to-day running of the industry on a more democratic basis. On one hand it was felt that senior positions had formerly gone too often to those who had enjoyed special educational privileges or who had a 'pull' with management; on the other, that as soon as the management of industry was in the hands of those who had risen from the ranks industry would be conducted in a more co-operative and understanding manner, while the rank and file would be able to express their views and preferences with the assurance of a sympathetic reception. How far such expectations were realistic is beyond the scope of the report.

Dealing with the individual industries, the report, covering the position up to the end of 1950, records the appointment by the Gas Council of its Education Sub-Committee and states that, in general, before nationalisation only a very few large undertakings operated schemes, and the only comprehensive scheme covering all grades of employees was operated by the Gas Light and Coke Company. The North Thames Gas Board has continued to operate schemes inherited from the Gas Light and Coke Company without major changes. The East Midlands Gas Board introduced an education scheme on August 1, 1950, but at the time the report was prepared no other boards had announced comprehensive schemes, though they were giving active consideration to preparing them. On the question of promotion the report says the gas industry has not so far developed a national policy; meanwhile the area boards continue the practices they inherited. There has, however, been some development in introducing the principles of advertisement of vacancies and of filling positions from within the industry where possible. An exception to this general pattern is provided by the North Thames Gas Board, which inherited fully unified practices from the Gas Light and Coke Company, under which promotion is purely on merit.

A whole chapter is devoted to problems of personnel organisation which affect the more highly centralised industries to a greater extent than the gas industry, in which the 12 area boards are autonomous bodies separately responsible to the Minister of Fuel and Power. The Gas Council has its Industrial Relations Committee and Officer, the latter responsible for relations with trade unions and especially, of course, negotiations on national wage agreements. Among the area

boards there is no common pattern or organisation. Being fully independent the boards have devised their subordinate structures, tending to follow the organisations they inherited where such existed. No attempt is made to describe all the boards, but three are cited as widely differing examples—North Thames, with its fully developed pattern of personnel organisation; Wales, with its Industrial Relations Officer as the only specialist personnel officer in its territory, but with a committee on personnel and staff relations comprising 12 local managers chosen for their special interest in such matters; and the Eastern Gas Board, responsible for highly organised urban divisions near London and sparsely populated rural parts of East Anglia, which has one specialist officer at headquarters and specialists also working in the two urban divisions (Tottenham and Watford).

Influence of individuals has led to variations between and within industries, notably in gas, where the area board chairmen have had scope to fashion organisation according to their own ideas. Existence of variations is not necessarily undesirable, but the report suggests that the time has come for the boards to take stock of the position and to ask whether adoption of existing practices has in all cases led to the best possible pattern of organisation.

## PLAIN SPEAKING IN WALES

CANDOUR is encouraged at the half yearly conferences of the members, chief officials, and group leaders of the Wales Gas Board, and the latest meeting at Aberystwyth, attended for the first time, as a guest, by the chairman of another area board, was no exception. The agenda is always a heavy one, and much time is inevitably taken up by the chief officials who make the most of the six-monthly opportunity of explaining matters of administration, planning, distribution, accountancy, industrial relations, coal stocking, and so forth, which would otherwise be the subject of many circulated communications and probably a lot of explanatory correspondence. Group chairmen and conveners, able to speak not only for themselves but for the managers of the individual undertakings in their respective groups, thrash out points of detail, challenge the necessity for filling in this or that form, and take back to their own group committees a clear impression of the requirements, wishes, and suggestions of the Board. In some respects the novelty of the half yearly conference is wearing off, and it has been suggested that there might without loss of contact be a longer interval between successive meetings, particularly as there are other means of keeping the groups in touch with each other and with headquarters. We do not know exactly how often the group chairmen from the remote corners of Wales journey to Cardiff, but certainly there are meetings at fairly short intervals, and a good deal of time is spent in travelling. It might well be that the Aberystwyth conference could serve its purpose no less effectively and be enhanced in interest rather than otherwise, if it met, say, once instead of twice in the year.

The conference on October 19-21 was the sixth of the series, and the Chairman and members of the Board are warmly to be complimented on preserving a freshness and originality in the 'attractions.' The bulk of the papers must necessarily follow a set pattern, but time is invariably allowed for some departure from monotony, and this time, in order to obtain the views of managers and other officials of undertakings, the paper included one from a group chairman—Mr. O. P. Cronshaw, of Rhyl—and another from a group committee convener—Mr. W. I. John, of Cardigan Bay—on relations with headquarters as seen by group and undertaking. Both were invited to express their views quite freely and to criticise, if they so desired, the administration of the Board as seen from their respective angles. The fact that neither had anything harsh to say was a sign, not of weakness, but of the large measure of satisfaction that exists under a system which is peculiar to Wales. Mr. Cronshaw's main point was the need for more contact between groups, and greater confidence in the organisation. There was nothing so unsettling to good work as a sense of unequal treatment which may or may not be justified, and which may be real or imaginary, and Mr. Cronshaw would like the left hand to know a little of what the right hand does. He has an impression that too much is expected from managers of some of the smaller undertakings; it may be that the particular group has not the resources to give much help, even taking into consideration the group distribution officers and technical assistants. He feels it should be the duty of someone at group level daily to scrutinise test results and reports made by technical assistants and to initiate any action that may make for improvement. The group, in his view, should be large enough to support a group accountant; there should be no divided allegiances. There are some matters in which it would be foolish for group committees to be self-contained.

The main point made by Mr. John was the reality of the need for personal advice and assistance on functional matters, particularly among managers of small undertakings which lack specialist services. Privileged is such a manager who receives a visit from a chief officer; privileged in that he has secured intimate conversation with a specialist, not afforded to the majority of his colleagues. This is no reflection on the chief officers; their departmental duties obviously restrict these activities, so infrequent must such visits, of necessity be, that they constitute a weak link in the chain of relationships. This has been recognised by the Board, which has appointed group officers to strengthen the link. That the greatest benefit may derive from these appointments it is essential that free and direct contact between managers and group officers is afforded. It follows that group officers must have direct relations with their respective chief officers.

The application of these principles does not in any way affect the functions of the group committee. Any decision or recommendation arising from direct consultation must emanate from the group committee. The work of the group committee is, however, facilitated in that it is provided with concrete proposals. The attendance at such meetings of the group officers concerned

would aid discussion and contribute to the formulation of decisions and recommendations. The group chairman's position is one of great trust. The manner in which he fulfils his function can have a profound bearing on relations generally. Although the conference is not a policy-making instrument, policy is influenced by it. It presents an opportunity to group chairmen and conveners to express their views on all aspects of the administration and management. Its value lies not least in the facilities afforded for informal discussion—the free exchange of views and ideas. It has justified itself as a pillar in the democratic structure of the industry in Wales.

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## *ATOMIC CENTRAL HEATING*

INFORMATION has been published about the world's first atomic central heating plant—that at the Atomic Research Establishment at Harwell. Last week a building containing 80 offices started its central heating from Bepo, the experimental atom pile. It is understood that in time further buildings will have 'atomic radiators' and that the Ministry of Supply's coal consumption for heating will be cut by 1,000 tons a year. Hot water for central heating is obtained from a heat exchanger in the outlet duct of the pile's air-cooling system. It is circulated in a closed circuit to a secondary water-to-water heat exchanger which supplies water for space heating and washing. Air temperature at the primary heat exchanger, states the Ministry of Supply, is 135°F., and the water is heated to 130°F. Next year these temperatures will be substantially increased. Heat output designed for the first building is 1 mill. B.Th.U. an hour. For the final installation the output will be 7 mill. B.Th.U. an hour (70 therms an hour). The space now being heated amounts to 330,000 cu.ft. (floor area, 32,000 sq. ft.). Costs of the installation amount to £15,000. Any attempt to assess the economics of the system would, of course, be without meaning. What, for example, is the cost of the heat in the warm outlet air of Bepo? But atomic central heating is scientifically remarkable and of extraordinary interest generally—more particularly at the moment to the North Western Gas Board.

## *BY THE RIGHT, NUMBER!*

THERE is a growing tendency, not restricted to the gas industry, to 'codify' articles of simple everyday use. We view this tendency with apprehension, for life today is complex enough without having to identify our common purchases by strings of letters and numerals. We appreciate that these codes have a special meaning to those 'in the know.' We realise also that many purely industrial items and, indeed, spare parts for all types of equipment are best identified by code numbers. But when the housewife has to go into a shop and ask for a 'B.45' broom handle or a 'Z/X 52' toasting fork we feel that 'rationalisation' has gone far enough. Some of our 'fancy' trade names are sheer horrors in their pandering to slickness, punning, or sentimentality; but shopping loses all pleasure (if it has any nowadays) and all human touch when we have to refer to a gas appliance by a number which might just as well apply to an aeroplane or a submarine, or by letters which suggest some obscure branch of the fighting forces.

How grave, too, is the danger to the innocent mind when a piece of apparatus is given by its makers a number which might well imply that it was built to mark the retreat from Moscow or the relief of Mafeking. The public loves names for things. How much more romantic is the railway engine with a name than one with no more than a dull number (though we know that the latter is all important to the youthful engine spotter). The civil service has reached the ultimate nadir in its coding of official forms, and there is little joy in having to refer to a gas cooker as though it were an application for a driving licence or to a water heater as though it were an income tax return. May we not get back to the simple things of life and call our appliances by ordinary pleasant-sounding names?

## *ACCORDING TO TEMPERATURE*

GAS engineers—'manufacture' and 'distribution'—are rightly paying a great deal more attention to weather forecasting. Many useful papers relating gas demand to temperature have been published in recent years and the subject is assuming not merely a scientific interest, but a real practical help. All the modern tendencies in gas manufacture and distribution will add importance to the application of this fascinating subject. Centralised manufacture, integration of supply, remote control, render intelligent anticipation of demand more necessary, and in spite of the element of chance—and the weather in Great Britain can certainly be freakish—correlation of weather conditions and gas demand can and does result in better gas service to the consumer. In our issue last week (p. 494 *et seq*), under the title 'Distribution Control in Interlinked Undertakings', a paper was published on this problem by Mr. F. S. Charnley, Deputy Chief Engineer to the North Eastern Gas Board. Mr. Charnley pointed to the valuable investigations made and reported by the former Gas Light and Coke Company and the former Liverpool Gas Company, mentioning in particular the treatment by Mr. D. G. Rose of the mathematical relationship between temperature and demand. Knowing the variation in the level of consumption, said Mr. Charnley, it is usually possible to estimate the output to within ±2% except on special days, such as Bank Holiday week-ends, when, as he particularly observed, the normal habits of the public may be upset. In our columns today we summarise a paper given to the Manchester District Junior Association of Gas Engineers on November 14 by Mr. H. Mainwaring, Distribution Engineer, Manchester group, North Western Gas Board, whose contribution was concerned with the effects of seasonal and daily temperature changes on gas consumption in the Manchester undertaking.

Mr. Mainwaring described, with reference to several graphical diagrams, a method of examining the conditions affecting daily consumption values, and we set out the argument on which the graphical interpretation was based. Constant observation and examination of consumption values are needed if estimates of demand are to be predicted with accuracy and applied usefully. These estimates are, of course, of particular value in the winter when the rapid increases in load which occur with sudden falls in temperature can be assessed and gas-making plant adjusted to meet the increased demand. We were interested in how the fuel shortage of last winter was reflected in increased gas consumption. In the Manchester undertaking the additional loads were attributed to the consumers' use of all available gas appliances for heating purposes. Compared with normal conditions this raised the consumption by an amount equivalent to a temperature reduction of 6° below the standard for the period.

# Letter to the Editor

## TECHNICAL ASSISTANTS' SALARIES

DEAR SIR,—Your correspondent, 'Gas Engineer,' writing in the *Journal* of November 21 on the subject of the inadequate salaries offered by some gas boards to technical assistants, expressed the hope that the British Gas Staff Association would take some action to remedy the unsatisfactory state of affairs.

I would assure 'Gas Engineer' that the Association endorses his views, not only regarding technical assistants but also many other classes of qualified and responsible employees. The policy of some gas boards in offering extremely low salaries is already starving the industry of suitable entrants and this policy will undoubtedly have far-reaching effects.

Salary scales for technical officers have been negotiated nationally and in the negotiations it was clearly understood that Grades II and III would only be used for subordinate employees not likely to advance technically and as preliminary grades for those who were in the process of gaining qualifications; in other words, those who were doing a semi-technical job or young men obtaining practical experience while sitting for examinations. The *lowest* grade, therefore, which is available for any staff officer doing a fully technical job is Grade IV, rising to £460 per annum (Provincial A). Grade IV, however, should not, in my opinion, apply to qualified employees undertaking the responsible technical duties enumerated in 'Gas Engineer's' letter.

It was anticipated that the managements, who have the right in the first place to decide the salary scale which will apply, would exercise that right reasonably, but some have not done so and this has led to the very numerous appeals which my Association is now having to handle.

The officers of this Association had already been instructed, before the publication of 'Gas Engineer's' letter, to take up with the boards concerned cases of inadequate salaries offered to technical assistants, but perhaps the most effective action would be a refusal by all technical employees to apply for such vacancies.

Yours faithfully,

F. C. HENFREY-SMITH,
General Secretary.

British Gas Staff Association,
203, Knightsbridge,
London, S.W.7.

November 22, 1951.

# Personal

**Mr. O. Ashby,** Joint Manager of the Whitstable gas undertaking, is retiring after 37 years' service in the gas industry.

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**Mr. Percy W. Howard** has been appointed Managing Director of the British Tyre and Rubber Company, Ltd. Mr. Howard joined the Company as Sales Manager in 1926, afterwards becoming General Sales Manager and (in 1949) Sales Director. He began his business career with the Hoffmann Manufacturing Company, Chelmsford, and was subsequently Sales Manager of the Pyrene Company and later of Pirelli, Ltd.

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**Mr. J. C. Carr,** C.B.E., has been appointed to the Board of Thomas Summerson and Sons, Ltd., Railway Siding Engineers, and their subsidiary companies, on his retirement from the post of Principal Assistant Secretary in the Ministry of Supply. Mr. Carr entered the Administrative Civil Service in 1912, in the then Local Government Board. After war service in the H.A.C. he returned to the newly-formed Ministry of Health, where he was Private Secretary successively to Sir John Anderson, C.B., and to Sir Robert Mount, K.C.B. In 1920 he transferred to the Treasury and in 1934 to the Import Duties Advisory Committee, where, as Assistant Secretary, he dealt mainly with the tariff on steel and other metals, and engineering products. Since 1939 he has been in the Ministry of Supply. He acted for a short period in 1946 as Iron and Steel Controller, and has latterly been concerned mainly with the nationalisation of the steel industry.

**Mr. J. A. Woodcock,** Assistant Station Engineer at the Gloucester works of the South Western Gas Board, has been appointed Works Manager of the Great Yarmouth undertaking and also of the Gorleston works of the Eastern Gas Board. Mr. Woodcock, who was for some years with West's Gas Improvement Co., Ltd., was Assistant Engineer and Manager at Yeovil prior to his appointment at Gloucester.

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**Mr. P. J. C. Bovill,** B.SC., Local Director, and General Manager of the Chemicals Branch of Newton Chambers & Co., Ltd., has been appointed a Vice-Chairman of the local Board. This announcement was made recently by Sir Harold West, Managing Director, at a management conference attended by the Company's local Directors, Managers, and senior executives. Mr. Bovill has spent the greater part of his business life with Newton Chambers and subsidiaries. He was educated at Cheltenham College, and graduated in Fuel Technology at Sheffield University.

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**Mr. E. H. Discombe,** a Delegate Director and Commercial Manager of Murex Welding Processes, Ltd., Waltham Cross, has recently retired after over 35 years' service with the Company. Before leaving he was presented with a cheque on behalf of the staff by the Managing Director, Mr. H. J. Penn. Mr. Discombe was a founder-member of the Premier Electric Welding Co., Ltd., in 1918, and was its first Secretary and later Assistant Manager. With the amalgamation of the Company with Murex Welding Processes, Ltd., Mr. Discombe took up the position of Commercial Manager and later became a Delegate Director.

# Diary

**Nov. 29.—North Thames G.C.C.:** Westminster City Hall, Charing Cross Road, 2.30 p.m.

**Nov. 30.—North Thames, Eastern and South Eastern Home Service Advisers' Discussion Group:** Demonstration on 'Cake Icings and Finishes,' 178-180, Edgware Road, 6 p.m.

**Dec. 1.—Manchester Juniors:** 'Large Scale Cooking', C. H. Longley (Industrial Section, Liverpool); visit to Wavertree Works and Central Laboratories of Liverpool Group.

**Dec. 3-7.—Smithfield Show and Agricultural Machinery Exhibition,** Earls Court, (Gas Council exhibit).

**Dec. 4.—South Eastern G.C.C.:** Caxton Hall, Westminster, 2 p.m.

**Dec. 5.—London and Southern Juniors:** Reception and Dance, Caxton Hall, Westminster, 6.30 p.m.

**Dec. 5.—Wales Juniors** (North): Visit to Trent Vale Bakery of Birkett and Roberts, Stoke-on-Trent, 1.45 p.m., followed by paper on 'Gas in the Baking Industry,' by J. A. W. Stretton, Assistant Industrial Gas Engineer, Wales Gas Board, in the Staff Canteen.

**Dec. 8.—Western Juniors:** 'Transport,' A. G. Thorne, and visit to Bath gasworks, 2 p.m. Silver Jubilee Dinner, Fortts Restaurant, Bath, 6 for 6.30 p.m.

**Dec. 8.—Scottish Juniors (Eastern and Western):**—Joint meeting, 'Power Generation in Gasworks,' W. A. Train (W. H. Allen & Son, Ltd., Bedford), Heriot Watt College, Edinburgh, 3 p.m.

**Dec. 11.—Midland Juniors:** 'Planning and Development of a 6 mill. cu.ft. Vertical Retort Installation and Ancillaries,' A. W. Sanders (Leicester). Staff Mess Room, Birmingham.

**Dec. 11.—Wales Juniors (South):** Students' Paperette Day, Cardiff.

**Dec. 12.—South Western G.C.C.:** 34, Bridge Street, Taunton, 11 a.m.

**Dec. 14.—Manchester and District Section, I.G.E.:** 'The Economics of Gas Production,' T. Nicklin, M.SC., Production Engineer, North Western Gas Board, Grand Hotel, Manchester, preceded by luncheon.

**Dec. 15.—Yorkshire Juniors:** 'Carbonisation,' J. Burbridge, York.

# Sequel to Middlesbrough Gas Explosion

## Northern Gas Board Not to Blame

JUDGMENT exonerating the Northern Gas Board from blame was delivered by Mr. Justice Ormerod at Durham autumn assizes on October 26 in an action by three plaintiffs arising out of an explosion in September, 1949. The action was by Rose Adams, for damages for loss sustained by the death of her daughter Rosie Adams, and by Ada Edith Beaney (now Mrs. Hawes) and Thomas Lewis Colby for damages in respect of personal injuries, against the Northern Gas Board and the Board for the Newcastle Regional Hospital Area. Miss Adams and Miss Beaney were employed as nursing orderlies at St. Luke's Hospital, Middlesbrough, and Mr. Colby was employed as a boilerman at the same hospital.

It was stated that in 1935 a nurses' home was added to the hospital and connected with it by what was known as the 'Blue Corridor.' A separate gas main was laid to the nurses' home from a point at which the main went to the hospital and entered the new building near the boiler house. The work was done by what was then the Middlesbrough Gas Department, now vested in the Northern Gas Board.

On the evening of September 17, 1949, the two nursing orderlies passing through the 'Blue Corridor' noticed a smell of gas and met the assistant matron, who told them she had already rung across to the hospital for a man to come over and attend to what was obviously an escape of gas. Realising that the matter was in the hands of the assistant matron, one of them went to her own room and the other went round the nurses' home and satisfied herself that the smell of gas did not arise from any gas appliance having been left on. Eventually the boilerman came across and having detected no smell on the way he went to the boiler house, where there were two gas boilers, one of which was actually in use. He found no smell of gas there, but as he came up the steps of the boiler house to go outside again he found a strong smell. He determined to go and turn off the gas at the main, but had only gone a few steps when there was a serious explosion which resulted in the death of Miss Adams and injury to Miss Beaney and Mr. Colby, the latter being buried in the debris.

### Pipe-Laying Practice

Delivering judgment, his Lordship said it was claimed that the Gas Board was negligent in the way the pipe was laid. It was said that the pipe was so rigidly held in the hole in which it passed through the outer wall that it was not capable of movement, and that when there was, as indeed seemed to have been a fact, a subsidence outside the outer wall which caused a portion of the pipe to take a lower level, the strain on the pipe was such that it snapped. An engineer called as a witness by the plaintiffs had said that it was wrong for the pipe to be laid in such a way that one portion of it was held rigid while the other portion was laid in soft ground. He had gone further and said that if he had been laying the pipe he would not have used an iron pipe at all but would have used a steel pipe which would have been more flexible.

'I am satisfied that that would not have been regarded as good practice and should not have been done' commented his Lordship. He had since heard the evidence of an officer of the Gas Board and he thought it was abundantly clear that the reason why the fracture occurred in the gas pipe was that the portion of the pipe inside the building was rigidly held and the portion outside was not rigidly held, and that therefore a strain was put on at the junction where the rigid and non-rigid portions met. His Lordship was satisfied that the method adopted for laying the pipe outside the building was in accordance with accepted practice and that there were no special circumstances which would require any departure from standard practice.

So far as the portion buried inside the building was concerned, that had a good deal of rubble packed tight on it but the evidence of the foreman was that when he left it, after doing all that the gas undertaking had contracted to do, the pipe was left uncovered and any covering which was put on it, or any packing down on top of it, was done by the contractors, not by the gas undertaking at a time when the latter had completed their work and had no further responsibility with regard to it.

It had been suggested by Mr. Clifford Cohen, Counsel for plaintiffs, that it was the duty of the gas undertaking, having laid the pipe, to ensure that the builders did the work of covering the pipe afterwards properly, and not make it rigid, as in fact they did. That, he thought, was putting far too high a duty on the gas undertaking. The work was being done by experienced builders and contractors, and they could see the pipe that was there. They knew the principles involved in the laying of gas pipes and it was for them to ensure that a proper and suitable covering was put on the pipe, if a covering was necessary at all.

His Lordship was satisfied that so far as the first defendants were concerned they laid the pipe in accordance with standard practice and that there was no ground for saying that they were negligent in the laying of the pipe. True the pipe did in fact fracture admittedly because of a subsidence in the ground, but that was something which they had no reason to expect would take place.

So far as the Hospital Board was concerned, it was alleged by the plaintiffs that they were negligent for various reasons set out in full in the statement of claim. It was contended that they gave no proper instructions to their servants as to the method of cutting off the gas supply; that there was no proper system for dealing with danger from a large leakage of gas; and that there was delay in attending to the matter after the smell of gas had been reported by the nursing orderlies and the assistant matron. He was satisfied that there was a serious lapse of duty on the part of the hospital authorities in not making any suitable provision for dealing with such an emergency.

He found the second defendants wholly to blame. He did not suggest that there was gross negligence, but he was satisfied that there was negligence on the part of the hospital or their servants, and under those circumstances they were responsible for the damages to the plaintiffs for the losses which they had respectively suffered.

To Mrs. Adams he awarded £250 damages under the Law Reform Act, £600 (less the £250 which she would receive under the Law Reform Act) under the Fatal Accidents Act, and £36 3s. 6d. agreed funeral expenses. In the case of Miss Beaney, who had since married, he found that a proper sum was £650, plus agreed special damages of £93 14s. 1d. So far as Mr. Colby was concerned he thought £600 and agreed special damages of £9 12s. 4d. represented a proper figure.

An order for costs was made against the Hospital Board. After legal argument the Judge made an order so that the first defendants, the Gas Board, could recover costs against the second defendants, the Hospital Board.

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## Gas Stock Values

The Minister of Fuel and Power has declared by Order that the values of the following securities have been determined under Part II of the Gas Act, 1948, the conversion date being November 19, on which date the securities were extinguished and the holders became instead holders of Britist Gas 3% Guaranteed Stock, 1990-1995 (issued at par and redeemable at par) calculated in accordance with the rates mentioned.

| Company | | Unit | Compensation Value |
|---|---|---|---|
| Abernethy | Ord. shares | £1 | 7/6 |
| Edenbridge | 4% Mort. debs. | £50 | £50/2/6 |
| Hellifield | 5% 1st Mort. debs. | £50 | £51/15/– |

In the case of these securities the Minister has issued a direction to the Gas Council to pay interest on December 3. The Gas Council proposes to discharge in full to the appropriate holders all outstanding interest accrued to October 31, 1951, on the British Gas Stock issuable by way of compensation.

The usual procedure regarding transfers, the exchange of certificates, etc., applies on and from the conversion date to holdings of British Gas Stock issued in exchange for the old securities.

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# DRAWING OFFICE BUILT ON ROOFTOP

## *Ingenious Extension to North Eastern Gas Board's Leeds Headquarters*

THE Chief Engineer's department of the North Eastern Gas Board has recentlv acquired additional drawing office accommodation at the Board's head office in Leeds, in an ingenious and economical way.

Faced with the difficulty of having no available space by which they could extend their main drawing office, it was decided to make use of the flat roof of the Bridge Street premises, by erecting a prefabricated, sectional timber building. Our photograph shows the completed drawing office, measuring 36 ft. long by 26 ft. wide, in its roof-top position.

The interior walls and roof are insulated with wall boards, and ample lighting is obtained from the perspex roof lights. Heating is by radiators which are connected to the central heating system of the main building.

The new drawing office which accommodate eight to ten members of the Board's engineering staff, was designed and erected by Messrs. H. Peel, Ltd., Sowerby Bridge.

# Proposed New Works for East Anglia

PRELIMINARY plans which the Eastern Gas Board has under consideration for erecting a large modern plant at Lowestoft were placed before a conference of interested parties called by Lowestoft Town Council on November 22 and held in Lowestoft Town Hall. The conference was of an informal character and was called for the purpose of explaining to owners of property near the site and to municipal representatives the effect the proposed plant might have on the area. It was addressed by Mr. R. A. Weston, General Manager, Mr. E. Williams, Divisional Engineer, Mr. R. A. Waller, Divisional Secretary, and Mr. D. M. Cox, Solicitor, officials of the Eastern Gas Board.

The plans, which Mr. Weston explained were only in a very preliminary stage and were as yet without any worked out details, envisaged the eventual replacement by the new plant of 12 existing plants and the supply of gas from Lowestoft over a wide area. A 24-in. main would take gas from Lowestoft to Beccles, and from then on a 20-in. main would take the gas to Norwich for the supply of that city. Yarmouth, Gorleston, Beccles, Bungay, Halesworth, Loddon, Diss, Harleston, and Southwold are among the towns of East Suffolk and Norfolk which, in addition to Lowestoft and Norwich, would be supplied from the new plant.

If the necessary permissions are received it is possible that a start in building may be made in 1953 and that the first gas will be ready in 1957. A plant having a capacity of 10 mill. cu.ft. per day is envisaged and it is stated that the proposed site at Lowestoft, on the shores of Lake Lothing and the Lowestoft inner harbour, is eminently suitable because it has adequate facilities for sea, rail and road transport. It is expected that all of the coal would be imported by sea from the Durham and North Eastern coalfields. The requirements of the Board are based on a daily production target of 10.8 mill. cu.ft. by 1958 and 19.9 mill. cu.ft. by 1957.

At the conference officials of the Board went to some lengths to assure those present that everything would be done to erect a plant which was not unpleasant to look at from an architectural point of view and Mr. Weston said that the Board would be advised in this matter by the Royal Fine Art Commission. Mr. Williams gave an assurance that steps would be taken to ensure that there was no nuisance from smell or dust.

It was emphasised that the present works at Lowestoft are not capable of any wide expansion and that any move of those works, the most easterly gas plant in England, must be considered in relation to a wider scheme.

## Maintenance Men's Wages

A statement issued from Gas Industry House on November 21 announced that agreement had been reached between the Gas Council and the Confederation of of Shipbuilding and Engineering Unions providing for an increase in wages of 3d. an hour for works maintenance craftsmen employed in the gas industry. This increase took effect as from 6 a.m. on Sunday, November 25.

**Damage Estimated at £50,000** was caused by a fire which swept through the administrative offices of the Perth Group of the Scottish Gas Board at Friarton, Perth. The building was nearly burned out within 90 minutes and many files and records were lost.

# Electronic Calculator for Distribution Problems

A DISTRIBUTION system calculator which in the space of a few hours performs calculations of flow patterns and pressures, eliminating days or weeks of study required to obtain similar data by other means, has been developed and placed in operation at the Institute of Gas Technology in Chicago.

The chief problems of the gas distribution engineer are:—

(i) Checking the character of the flow pattern in the mains and the adequacy of the system to meet its load requirements.
(ii) Modification of the distribution system to meet increased loads.
(iii) Design of optimum or ideal layouts of mains to be used as guides in the development of new areas.

The volumes of gas flowing through a given section of a distribution system are usually calculated from pressure measurements in governor pits and computed service requirements based upon customer appliance demands (with appropriate diversity factors). When the section of pipe is operating as a part of a grid system—with interconnected mains and the multitude of services commonly associated with grid systems—evaluation, by the usual methods, of a particular section's operation is virtually impossible. The complexity of the study is compounded if a complete survey of a system is attempted, for that requires pressure and flow rate measurements at every governor pit, mains junction, and service in the system. After these data are obtained, infinite calculations are necessary for their interpretation.

## Development of the Calculator

With the objective of simplifying distribution system calculations, the Institute in 1950 began a study of the possible use of a calculator which would utilise similarities between the flow of electricity and the flow of gas:

| Electricity | Gas |
|---|---|
| Voltage at source | = Pressure at source |
| Voltage difference due to resistance | = Pressure drop due to friction. |
| Current through resistor | = Flow rate of gas through pipe. |
| Current consumed by load device | = Volume of gas taken by consumer. |

No electric calculator entirely suited to gas distribution studies had yet been reported. In January, 1951, development of such a calculator was initiated as an Institute project with B. E. Hunt as project supervisor.

Except that certain electronic components of the calculator require a 110-volt AC power supply, the instrument is operated on direct current; its wattage requirements are low, and an ordinary radio 'B' battery provides the current used in the circuits employed in calculation.

The instrument has resistance components sufficient to permit the simulation of 240 sections of pipe. It has 120 load devices to represent up to that number of services or concentrated loads. There are enough positive terminals to allow calculations based upon as many as 48 points of supply.

The panels are so constructed that if it is desired to study the effects of a pipeline failure, the network can be connected directly to the negative side of the battery. Two sets of meters and meter circuits are provided, and halves of the panel can be separately used in the simultaneous study of two problems. Provision has been made for the connecting of additional resistor and load panels to increase the capacity of the Calculator for studies of larger systems.

To set up a problem, a map of the distribution system is required. On it, all pipeline diameters and lengths must be marked, and gas requirements in 1,000 cu.ft. hour indicated at the points of demand throughout the system. The operator of the calculator then marks the map to identify each pipe section and load of the system with a resistor and load device of the instrument. A figurative model of the system is set up on the calculator by connecting the resistors and load devices in the proper sequence. The electric current is introduced at the point(s) on the instrument corresponding to the source(s) on the system. Each resistor is then adjusted to a value corresponding to the resistance to flow in a pipe of the length and diameter specified. The load devices are adjusted to consume current proportional to the gas demand at the positions shown.

The current at the source(s) is set proportional to the gas flow at the source(s). When the gas flow is unknown, but the pressure is known, the voltage is adjusted proportional to the pressure.

Subsequent adjustments of the resistors are made until the network is electrically 'balanced.' The current through each resistor is measured, yielding a figure for the gas flow in that pipe section. The voltage is then measured to establish a figure for the pressure at that point.

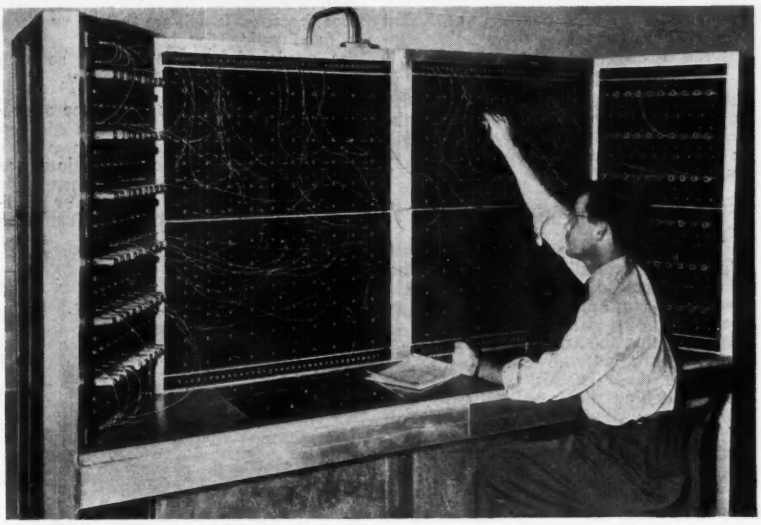
The meter readings are readily converted to gas flow rates and pressures.

## Uses of the Calculator

The rapid increase in urban population and expanded usage of gas for space heating have placed unprecedented demands on existing distribution systems. Many undertakings have been unwilling to assume this increased load, being fearful of the adequacy of their distribution systems' capacities. Some of these systems may be adequate; the Institute's calculator can aid in evaluation of these systems' capabilities. Many locations can be tested in succession without the fatiguing calculations which normally accompany such a task. The calculator also determines the best solution, instead of accepting the first which meets the problem's requirements.

In planning a new distribution system, an engineer can avoid months of calculation by merely submitting a map of the proposed system, with anticipated demands marked on it. The problem can be set up on the calculator, and by rapid trial-and-error methods the optimum layout will be determined, including pipe sizes and regulator locations.

The Institute's instrument is available to all members of the American gas industry, regardless of whether they are Institute members, at a nominal charge to cover the cost of the instrument and the operating engineer's time.



*B. E. Hunt operating the Institute of Gas Technology Distribution System Calculator. The centre panels contain the variable resistors; the side panels house the load devices; the metering sections are in the table.*

IN PARLIAMENT

# Coke to be Distributed Equitably

## Domestic Coal Allocation System Criticised

THE Minister of Fuel and Power (Mr. Geoffrey Lloyd) came under rapid fire at question time on November 19. Members (mainly from the Opposition side of the House) appeared anxious—and perhaps not without cause—over the arrangements for the distribution of solid fuel this winter.

Miss F. E. BURTON (Coventry South) asked the Minister what steps he is taking to secure a more equitable distribution of coke, particularly for those householders who are dependent upon this type of fuel. She drew attention to the position in her own constituency where, she said, more houses were being built than in any large town in the country, most of which were entirely dependent on coke for fuel supplies. She added that she was not asking for a larger supply but a fairer one.

Mr. LLOYD: I am in a position to offer the hon. Lady more than she asks. It happens that in the West Midlands the coke position is particularly bad, and it is to that area that we are proposing to move more supplies.

### No Favouritism

Mr. H. S. J. HUGHES (Aberdeen, North) was naturally concerned that his part of Scotland should not suffer as a result of any apparent favouritism towards the West Midlands and sought an assurance that the arrangements to which the Minister referred applied to the whole of these Islands, and (very properly watching the interests of his own constituents) particularly to the North of Scotland, where people are, he declared, finding great difficulty in getting coke.

Mr. LLOYD replied that the arrangements applied to the whole country. Broadly, he said, in the past coke had been consumed in the area in which it was produced, but the Ministry thought it better to equalise the supply over the country as a whole.

Mr. A. E. DAVIES (Stoke-on-Trent) criticised the arrangements for restricting supplies of household coal, and asked the Minister whether he would allocate a fixed ration to domestic consumers which they could be sure of getting, instead of a permissive maximum which they might not, in fact, get. Did the Minister not know, he asked, that the permitted maximum often meant something different when it reached the coalhouse of the consumer and that, having no statutory claim to a certain ration coal distributors themselves were put in grave difficulties, especially when cuts at short notice were imposed, and half the customers got the full ration and the rest had to get what they could? Would it not be better to have a fixed ration, possibly at a lower level, to be quite sure they got something?

Mr. LLOYD said he quite understood the hon. Gentleman's point of view, although he was obliged to answer 'No' by the practical difficulties. 'If the hon. Gentleman will think it out he will find that the fixed ration to an individual would create just as many difficulties as the present system of permitted maximum quantities.'

Mr. DAVIES returned to the attack by pointing out that he did not ask for a fixed ration for an individual. He was thinking in terms of a household. Would the Minister not appreciate that unless people could get a bit more coal during the winter there would be great hardship?

Mr. LLOYD: Even so, the hon. Gentleman is not producing a very constructive idea, because he will see that he proposes a fixed ration for households, whereas the needs of households vary so very much according to circumstances.

Answering questions about the allocation of coal and coke to hotels and service flats, the Minister said these were subject to the same restrictions as domestic consumers, except where they had been granted a licence for additional quantities by the local fuel overseer.

There was no practical way, however, in which his Department could arrange for fuel to be supplied at reduced prices to particular classes of consumers. The N.C.B. were debarred from favouring specified sections of the community.

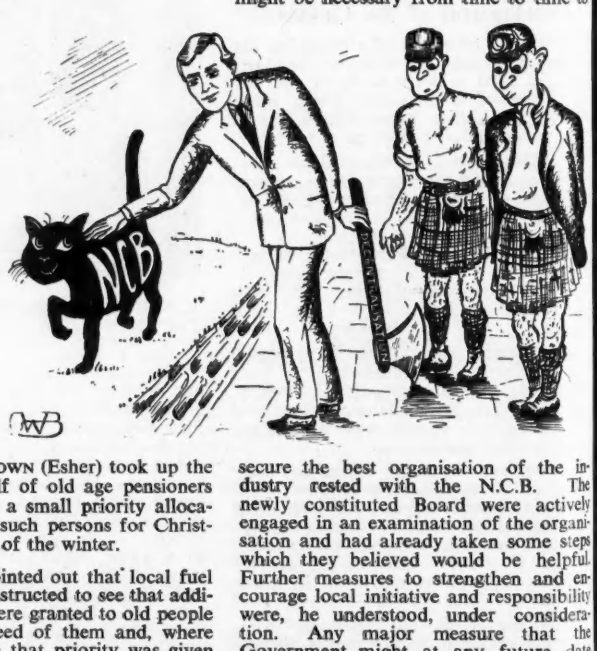
Mr. B. JANNER (Leicester, North-West) asked to what extent those who had fitted their homes with fuel saving combustion appliances using coke, anthracite, or briquettes could count on adequate supplies of fuel during the winter in view of the reduction of domestic coal supplies.

Mr. LLOYD: I am afraid there will be a shortage of boiler fuel this winter, but as I have explained in answer to an earlier question, I have approved arrangements for a more equitable distribution of coke, which should benefit householders who use this fuel in their appliances.

### N.C.B. Structure

Mr. C. F. GREY (Durham) asked the Minister what was His Majesty's Government's policy in regard to the structure of the N.C.B.

Mr. LLOYD said that the primary responsibility for making such changes as might be necessary from time to time to secure the best organisation of the industry rested with the N.C.B. The newly constituted Board were actively engaged in an examination of the organisation and had already taken some steps which they believed would be helpful. Further measures to strengthen and encourage local initiative and responsibility were, he understood, under consideration. Any major measure that the Government might at any future date think necessary in the national interest would only be taken after full consultation with those concerned. It was not the intention of the Government or of the N.C.B. to revert to district wages agreements or inter-district competition.




**Government statement will clear the minds of Scottish miners.**

Mr. W. R. BROWN (Esher) took up the cudgels on behalf of old age pensioners and pleaded for a small priority allocation of coal for such persons for Christmas and the rest of the winter.

Mr. LLOYD pointed out that local fuel overseers were instructed to see that additional supplies were granted to old people who had real need of them and, where necessary, to see that priority was given to the delivery of such supplies. In reply to further questions on the point, the Minister said that special steps were being taken to bring the position to the attention of the voluntary bodies which looked after the interests of old people.

Mr. GREY asked if the Minister was aware of the deep suspicion existing in the minds of the miners about the Government's attitude to the structure of the N.C.B. and the general feeling that they were going to be let down by the Party opposite. 'Do I take it,' he enquired, 'that the Party opposite have abandoned their idea of decentralisation? If so, may I ask if the Minister or his Party will withdraw from their Party manifesto their reference to decentralisation?'

Mr. LLOYD: Not at all. Not only is my reply quite in tune with the Conservative manifesto, but it is also in tune with the statement of Mr. Gaitskell when he introduced the amending Coal Industry Bill.

Mr. A. WOODBURN (Stirling and Clackmannan): Is the Minister aware that this statement will clear the minds of the Scottish miners particularly, who suffered very greatly under the old system of district boards and who would certainly refuse to go back to them?

Mr. LLOYD: Yes, sir. I do believe that hon. Members in all quarters of the House will realise that my statement will clear the minds of a great many miners on this point, and I hope that hon. Members in all quarters will do their best to further it.

Mr. S. T. SWINGLER (Newcastle-under-Lyme) asked the Minister to confirm his assurance by saying that when he stated that the Government would only sponsor measures after consultation with those concerned, 'those concerned' included the National Union of Mineworkers.

Mr. LLOYD readily gave his assurance on this point, adding that 'those concerned' also included the N.C.B. and other professional bodies in the industry.

### Consumers' Councils

Mr. R. MORLEY (Southampton, Itchen) suggested the existence of dissatisfaction with the make-up of consumers' councils for electricity when he asked the Minister if he would re-model such councils on a more representative and democratic basis. He pointed out that an hon. Member had recently said that nobody in his area knew either the names or the addresses of the members of their consumers' council, and since this lack of knowledge appeared to be fairly general, would it not be advisable to have these councils elected by a democratic vote of all the consumers in the area?

Mr. LLOYD pointed out that the general composition of consumers' councils was governed by statute, and he was not prepared at present to recommend amending legislation. He was surprised that the hon. Member was so keen to alter these organisations which, after all, were established by his own Party.

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**A Portrait** of the late Sir John Ferguson Bell, a former Mayor of Derby, has been presented to the town by his daughter, Miss E. Ferguson Bell. The portrait is by Townsend, and was subscribed for by the staff of the Derby gas undertaking (formerly Derby Gas Light and Coke Company, of which Sir John was for many years Chairman and Managing Director).

## LEICESTER HOME LIFE EXHIBITION

A FEATURE of the Leicester Home Life Exhibition which was held at the Granby Halls, Leicester, was the stand of the East Midlands Gas Board. Designed and constructed by the display department of the Board, this exhibit (which was over 80 ft. in length) presented an imposing and colourful appearance.

Divided into five sections, each section illustrated a particular range of equipment—home laundry, cooking, water heating and large scale catering, the focal point in the centre being a model kitchen in which cookery demonstrations were given daily by the home service staff of the Leicester undertaking. Attention was drawn to each section by an attractive photographic enlargement superimposed on the facia.

The resultant sales were exceptionally good, but the most pleasing feature, an augury for the future, was the keen interest shown by the large crowds which daily thronged the stand throughout the run of the exhibition.

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## BUTANE/AIR DEVELOPMENTS

### Experimental Plant in Carmarthenshire

PROPOSING the toast of the Institution at the annual dinner of the South Wales branch of the Institution of Mechanical Engineers at the Royal Hotel, Cardiff, on November 13, Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, said that the demand for gas for industrial purposes in South Wales was 30 times that of 1939.

New industries were made possible by the use of gas for heat treatment —he referred to aluminium rolling and nylon spinning—and today there opened up an immediate hope (might it soon become a certain prospect) of larger supplies of coke oven gas to industry which properly used could enable mechanical engineers still further to increase its production and efficiency. Gas now supplies the fuel needs of one of the largest electrical fluorescent tube and lamp manufacturers in Great Britain.

At that moment in Wales there was one development they thought most significant which was bringing even more closely together the steel and gas industries and further extending the sphere of activity of the mechanical engineer. In Whitland, Carmarthenshire, there was being installed the first ever in Great Britain experimental plant for the storage and distribution to consumers through normal town gas mains of liquid petroleum gas. Two alternative systems of producing butane/air mixture suitable for distribution to the consumer would be tried out.

Adaptation of consumers' appliances had been undertaken with the full collaboration of the consumers. The Wales Board experiment was being treated by the Gas Council as the pilot plant for the whole country. If the experiment proved the success they felt confident it would be it would open up great possibilities of improving the efficiency and expediency of gas supply in small communities where to date they had had to rely on old fashioned and less efficient coal gas plant, and there would certainly be marked savings in coal consumption as in arduous manual labour—both of which were in increasingly short supply. At that juncture he could say nothing about resultant financial economy.

The person entitled to the credit for this development was a Welshman, a member of the Wales Gas Board, and a member of the Institution of Mechanical Engineers and the South Wales Branch, Mr. E. M. Edwards.

*CONSULTATIVE COUNCILS IN SESSION*

# Eastern Coal Price Above the Average

## A Move Towards Uniformity

STATISTICS showing the average cost per ton of coal used by all the area boards were submitted to the Eastern Gas Consultative Council at its meeting at the Connaught Rooms, London, on November 19, under the chairmanship of Alderman R. Turner, J.P. The Council had felt that it had moved towards uniformity in the structure of gas prices but before complete uniformity was reached there should be a uniform price of coal for the gas industry, and the statement had been prepared as a result of a previous discussion. The figures, which had been extracted from the first report of the Gas Council covering the 11 months ended March 31, 1950, showed that the cost of coal varied from 53s. 6d. per ton in the Northern area to a maximum of 72s. 2d. per ton in the Eastern area, with an overall average of 63s. 3d. The pithead price of coal is the same for all the area boards, and the difference in average price is accounted for by quality and the cost of freightage from pithead to gasworks. As to quality, it was pointed out that the Eastern Gas Board takes 60% of its requirements in high grade Yorkshire coal.

The average cost of coal delivered for the Eastern area is 8s. 11d. per ton above the average for the country as a whole, and 18s. 8d. per ton above the minimum in the Northern area.

The CHAIRMAN said the difference of 8s. 11d. might not appear to be impressive, but when the national average of 63s. 3d. was compared with the costs at outlying districts such as Wickham Market, Bungay, Framlingham, Dunmow, etc., the difference was appreciable. Broadly speaking, the most they could benefit in the Eastern area would be 4.2d. per therm at Wickham Market, falling to 0.64d. per therm at Bedford, 0.26d. per therm at Peterborough, and 0.68d. at Wisbech, with an average for the whole area of about 1.46d. per therm.

### Gas for New Towns

The CHAIRMAN informed the Council that it had been reported in the local Press that the Welwyn Rural Council is objecting to a proposal that the capital cost of works required for the provision of a gas supply to the five new towns in the Eastern area should fall on consumers in the area. The Rural Council, who sought the support of the Hertfordshire Rural District Councils' Association, contended that the cost should be met by the Exchequer or borne by consumers throughout the country. These matters had before been referred to the Minister and the Consultative Council requested that the Chairman refer them to the Minister again.

### Aggregation of Consumptions

The Regional Board for Industry suggested that the Consultative Council should give consideration to the suggestion that firms with a number of separate factories in the same district, drawing supplies from the same works, should have the opportunity of aggregating their total consumption for tariff purposes. The Eastern Gas Board's policy is that aggregation of consumptions in separate premises be not allowed for the purpose of arriving at the charge to a consumer under Tariff No. 5 (the all-purposes non-domestic block rate), but aggregation may be permitted where the premises of a consumer are contiguous or are situated in the very near vicinity of one another and are controlled under single supervision.

The Council was in agreement with the Eastern Gas Board's ruling in this matter.

The Regional Board had suggested that the present scale of discounts under Tariff No. 5 should be amended to more favourable terms. It had also suggested that special consideration should be given to industrial night loads.

The Eastern Gas Board had stated that it had gone as far as it possibly could in its concessions to industrial consumers and with this the Council agreed.

With regard to a request from the Regional Board for Industry for an increase in the number of industrial representatives the Council was of the opinion that there were sufficient industrial representation on the Consultative Council and could not recommend to the Minister that this be increased.

### Gas Price at Bury St. Edmunds

Arising from the minutes of the Ipswich Divisional Committee, the CHAIRMAN reported that further correspondence had been received from the Town Clerk of the Borough of Bury St. Edmunds with regard to the price of gas. He had drafted a reply which he submitted to the meeting for approval. The Chairman reminded the Consultative Council that local authorities can only approach consultative councils in their capacity as consumers of gas and not as representatives of consumers of gas as a whole. It was resolved that the letter be sent to the Town Clerk.

The Chairman said he had first dealt very fully with depreciation. This had been calculated on the estimated remaining life of the assets taken over at vesting date and on assets installed since. He had pointed out that the Bury St. Edmunds Company before vesting date was on a renewals basis and he imagined there would not be the opportunity to carry out normal repairs and renewals both during and after the war owing to restrictions, and in consequence the price of gas would have been lower than if full and normal renewals had been possible.

The Town Clerk had said the main question which concerned his Council was whether the charge for depreciation should be borne by the consumers of gas in Bury St. Edmunds and by no others. In an early letter his Council's comment was that if a loss had been incurred at Bury St. Edmunds this should be spread over the whole area. The Chairman had reminded the Town Clerk that in June his Council, thinking that the recent increase of 3d. per therm included a penny which had been put on for uniformity, had instructed him to lodge a strong protest against the action of the Board.

A report had appeared in the *Bury Free Press* and this was repeated in no less than three London papers, which said that 'the Board had acquired £26,000 in hard cash which had been provided by the shareholders and directors of the Company exactly for the purpose for which a depreciation fund would have been provided if depreciation had been the proper method for the Company.' The Chairman said that the facts were that at vesting date there was a bank overdraft of £10,000 which the Board had to pay off.

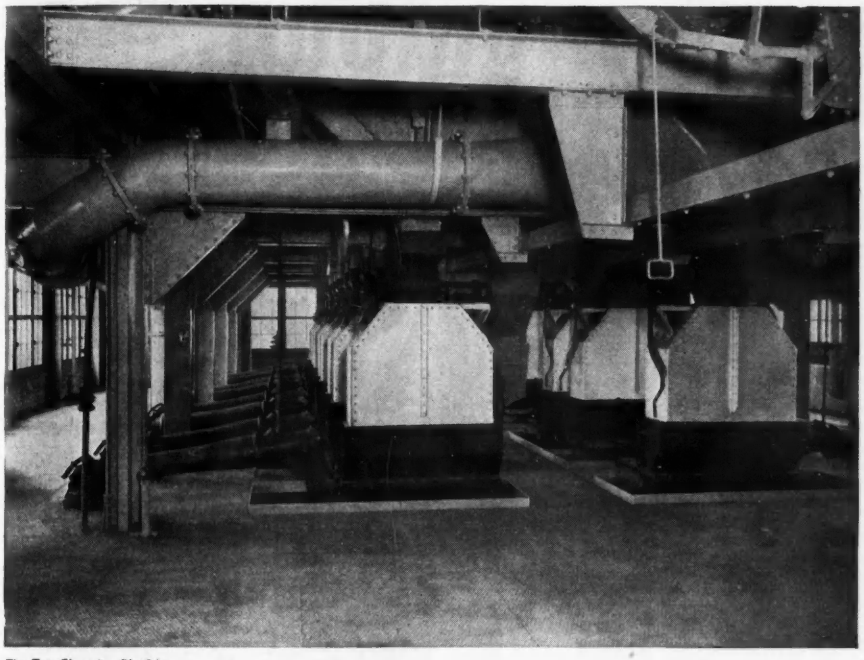
There was a reserve fund account with a credit balance of £11,300, which fund existed solely for the payment of dividends in any year in which the profits were insufficient. There was a special purposes fund with a credit balance of £5,500, which fund existed to meet charges of an extraordinary nature—*i.e.*, things which could not reasonably be foreseen. There was a balance at the credit of profit and loss, a 'carry forward' of £7,735 limited by the Company's special order to the total sum necessary to pay the succeeding year's interest and dividends.

None of these three funds could have been used except for the purposes for which they were created. In addition an amount of £2,600 had been set aside for the purposes of renewals, and a small amount for the purpose of equalising the retort renewals.

The Chairman pointed out that the Board was at the moment facing capital expenditure at the Bury St. Edmunds works of an amount approaching £200,000 of which £36,000 was applicable to renewals.

### Freedom of Choice

Arising out of a report of the last meeting of the Norwich Divisional Committee which, among other things, dealt with the difficult situation which had arisen at Beccles where the Borough Council had decided to exclude a gas supply from the first 52 houses of a new estate the Chairman reported the receipt of a letter from Mr. J. H. Dyde, Deputy Chairman of the Board, expressing satisfaction that the Consultative Council had decided to take up the question strongly with the Beccles Council, pointing out the short-sightedness of the policy of their housing authority.



The Top Charging Platform.

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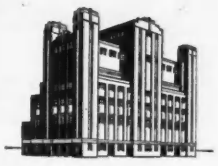

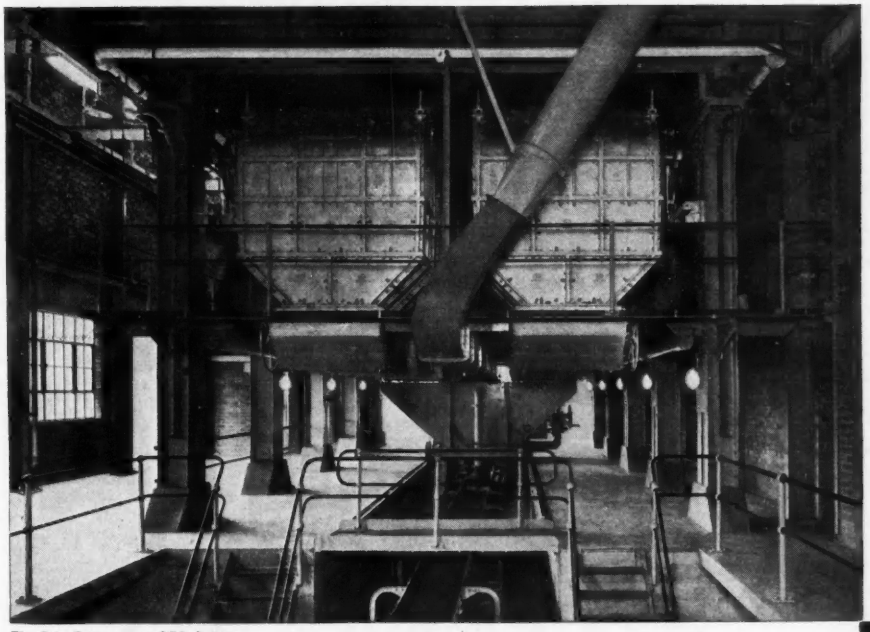

The Coke Extractors and Dischargers.

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*Most precious possession*

Three wise men, being once asked what was life's most precious possession, replied severally: Good Health: A True Friend: A Loving Wife.

Asked the same question today, they would reply in unison: A NEW WORLD 1840 GAS COOKER. With or without benefit of philosophers, the household which has one of these incomparable cookers enjoys all three most precious possessions. For good health waits upon good cooking; a good cooker is a true friend; and a happy cook makes a loving wife.

See the NEW WORLD 1840 Gas Cooker at your nearest Gas Showrooms and find out for yourself why more than two million loving wives say:

...it's a NEW WORLD PRODUCT OF Radiation Ltd for me!

31st October 1951

"*A thing of beauty is a constant joy*" wrote Keats originally, with more accuracy than in his later version about "a joy for ever". There was no gas cooker in the poet's Hampstead kitchen. If there had been, it is doubtful—industrial design of the period being what it was—whether it would have inspired him with a sentiment so admirable.

Today—in an æsthetically more self-conscious, if not more sensitive age—there may often be more poetry in the lines of a kitchen appliance than there is in the Third Programme. The NEW WORLD 1840 Gas Cooker doesn't write sonnets, but does produce meals which may be lyrical. That it is a thing of beauty you may see in the picture on the right. That it is a constant joy more than two million users of NEW WORLD Gas Cookers will testify.

We suggest that you see this distinguished appliance in your nearest Gas Showrooms.

...it's a NEW WORLD PRODUCT OF Radiation Ltd for me!

6d

PUNCH OR THE LONDON CHARIVARI—WEDNESDAY, OCTOBER 31 1951

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NEW WORLD NEW WORLD NEW WORLD

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"If you have two loaves, sell one and buy a lily"
By this the famed Li Po meant that man cannot live by bread alone. Neither can he live by Roast Beef, Potatoes, Yorkshire Pudding and Apricot Charlotte alone; nor by Roast Neck of Lamb, Potatoes, Green Peas, Apple Pie and Baked Custard * alone . . . But with the assistance of the Ministry of Food and a NEW WORLD 1840 Gas Cooker, he can have a good try. We can offer you no loaves, no lilies, no roast beef . . . and, no, not even any neck of lamb. We can and do offer the suggestion that you go quickly to your nearest Gas Showrooms and there ask to see these incomparable NEW WORLD 1840 Gas Cookers.
* From "Whole Dinner Menus", page 228 et seq of the Radiation Cookery Book, 40th Edition. Price 5/- nett at all Gas Showrooms.
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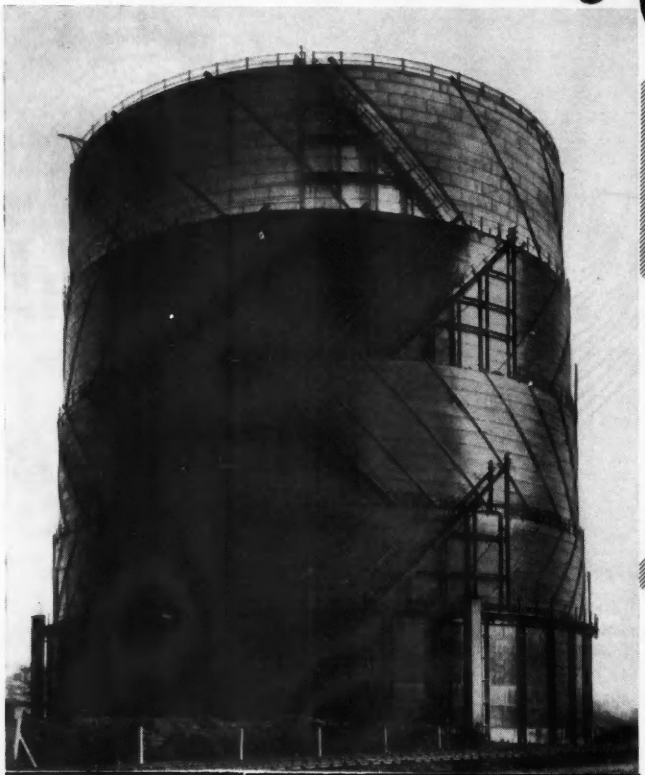
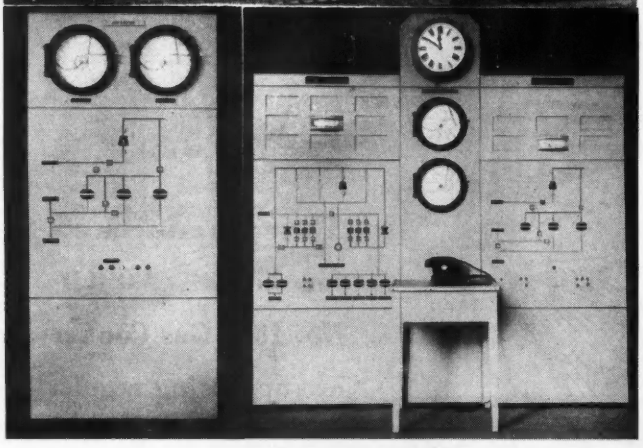
NEW WORLD NEW WORLD NEW WORLD

# Two Million Cubic feet





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## GASHOLDER

**With Remote Control**

**AT CHESTERFIELD For The**

## EAST MIDLANDS GAS BOARD

Four lift spirally guided Gasholder 135′ 0″, 138′ 0″, 141′ 0″ and 144′ 0″ dia. x 34′ 6″ deep, 2 million cubic feet capacity in steel tank 146′ 6″ dia. x 35′ 3″ deep, with foundations. Gasholder controlled remotely by two land lines three miles long.

Replacing a two lift standard guided Gasholder 155,000 cubic feet capacity in steel tank.

A further contract for a Gasholder of similar capacity at the Gas Works, Chesterfield, has also been received.

Illustrated on the left are the instrument panels with line diagrams at the Gasholder Station, WHITTINGTON and CHESTERFIELD.

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## ELLAND, YORKSHIRE.

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B.W.

Mr. Dyde wrote that he was surprised at the result of the initial canvass of the prospective tenants of the 52 houses, which showed that 41 said they would prefer electricity, and seven gas, while the remaining four gave no reply. The result of this canvass was contrary to what had been experienced in practice over the past year, for a detailed analysis showed that of the 11,313 new dwellings completed and occupied, including a number that had been all-electric 75.4% had chosen gas for cooking, 64.9% had had gas wash boilers fitted, and 32.6% had had solid fuel fires with gas ignition fitted. Of the 980 existing houses which had been converted, including large houses that had been separated into flats, and reconstructed houses, 89.5% had chosen gas for cooking.

There seemed to be some misunderstanding with regard to the charge in respect of each house for the installation of a gas supply. The minimum charge asked for was £4 per house as a contribution towards the gas supply, and this was the figure called for at Beccles. £4 did not, in fact, completely cover the cost of laying the internal supplies in the houses, and this should be compared with a charge for electricity, the internal supplies for which were about £25 per house and which the housing authority accepted without question.

Mr. Dyde's letter concluded: 'I am hoping that in the Ridley Committee, which has been set up to deal with the national fuel policy the important contribution gas can make in this policy will be fully realised. The present policy of the British Electricity Authority defeats me completely in so far as they are doing their best to put the gas industry out of business and accept domestic loads while being unable to give industry the necessary power which it requires to maintain our national economy. Moreover, it is quite evident from an analysis of its tariff structure that it subsidises the domestic consumer by the higher charges made to industry.'

# Cheaper Gas for South Wales

THE Wales Gas Consultative Council at its meeting at Cardiff on November 16 considered a statement from the Wales Gas Board in connection with proposed changes in the scale of industrial gas prices at Swansea. Mr. R. S. Snelling, Deputy Chairman of the Board, was introduced by Alderman G. F. Hamer (Llanidloes), presiding, and in presenting the memorandum he said the general level of gas prices inherited by the Board at vesting date in the area of the Swansea undertaking particularly as affecting industrial gas consumers, was materially higher than prices at undertakings of similar size and situation elsewhere.

The Board had received representations from individual industrial consumers and in particular from the Swansea Trading Estate Tenants' Association indicating that prevailing gas charges for industrial use were having a serious effect on industrial development in the area.

The opportunity to lower these prices arose from the fact that they were expanding the western grid. Extensions would probably be completed on or about the first week in January next.

The proposed new scale of prices for industrial consumers is as follows: For the first 50 therms per quarter, 20d. per therm; for the next 450 therms, 12.75d. per therm; for the next 3,000 therms, 12.5d. per therm; for the next 2,500 therms, 11d. per therm; for all gas in excess of 6,000 therms, 10.5d. per therm.

Summing up after Mr. Snelling had presented the memorandum, Alderman Hamer said that hitherto it had been impossible to produce gas at an economic price in Swansea. This reduction was due entirely to the fact that they had a new supply at a lower price, and they were taking the earliest opportunity of giving industrialists the benefit of a reduction.

In reply to questioners, Mr. Snelling said that the reduction would be about 1d. to 1½d. per therm, but for big consumers it would be considerably more. It was most likely that the benefits resulting from the extensions would later be extended to domestic consumers.

A resolution from the local Denbigh Committee 'that the Board's decision should be re-considered and that a rebate should be allowed,' was considered.

Mr. Snelling pointed out that the request for rebate had been refused by the Board on two grounds. First, the Gas Board was not responsible for gas supply during the period for which the claim was made. Secondly, while the old Denbigh Company's action in making this *ex gratia* payment of 25% affected themselves only, the Gas Board by doing the same thing would lay themselves open to claims from anyone who had or could produce one under any pretext. It would create a very dangerous precedent.

After some discussion a vote was taken when it was shown that general feeling of the Council was that the Gas Board had no liability in the matter.

Admittance of the Press to local Committee meetings was considered, but it was decided to defer discussion until local committees themselves had had the opportunity of informing their representatives of their feelings in the matter.

# North Eastern Surcharge Increased

AT a special meeting of the North Eastern Gas Consultative Council at Leeds on November 19, the Council was asked by the Chairman of the North Eastern Gas Board, Dr. R. S. Edwards, if it would accept the three-zonal tariff proposal as submitted (which was referred back at the previous meeting) on the understanding that a full review of the circumstances would be undertaken within two years, and that the Council should not feel bound in any way to accept the continuance of the three zones for more than this period if it agreed to the offer the Board was now making.

The Board's recommendation was put to a vote but this found the Consultative Council evenly divided—10 members voting for and 10 against. The Chairman of the Council, Councillor Regan, refused to exercise his casting vote, because he felt it would be unfair to do so on such an important matter.

Earlier a proposition by Alderman J. H. Whitaker (Todmorden) that the Board should have only one zone, and that this should be done by increasing by ¼d. per therm the tariff in Zone I, was rejected by 11 votes to 10.

After Dr. Edwards, Chairman, and Mr. G. E. Currier, Deputy Chairman of the Board, left the room, the Council held further discussion, but was unable to reach agreement.

When the Chairman of the Board rejoined the meeting, Councillor Regan asked if the Board had any further proposal to put to the meeting. Dr. Edwards, replying, said that in view of the Council being unable to put forward any proposal, and of the urgency of the matter from the revenue point of view, he had discussed the matter with the Deputy Chairman, and now made the proposal that the Board increase the temporary surcharge by 5%, making 15% in all instead of the present 10%, this to take effect from the next meter reading in December.

When put to a vote, the Board's proposal was carried by 14 votes to 5.

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## Stoke-on-Trent Dinner

Speaking at the recent annual dinner of the Stoke-on-Trent district of the West Midlands Gas Board at Stoke, Mr. Alexander Lee, Deputy Chairman of the Board, declared that the Etruria undertaking was now second only to that of Birmingham.

Mr. Lee spoke of what had been accomplished under nationalisation, adding that in spite of the tremendous progress made, expensive developments were planned to meet the growing demand from industrial and domestic consumers.

The company, numbering about 500, was presided over by Mr. J. S. Warrillow, Engineer and Manager of the Etruria gasworks. Among the guests were the Lord Mayor and Lady Mayoress of Stoke-on-Trent (Ald. and Mrs. H. Banks).

The toast of 'The Board' was proposed by Mr. W. Thompson (branch secretary of the General and Municipal Workers Union) and responded to by Mr. Lee.

# AMERICAN SPOTLIGHT

## *Items of Topical Interest from the Contemporary Technical Press of Canada and the United States*

### *HEART OF THE HOME*

AMERICAN GAS ASSOCIATION has earned an enviable reputation for leading important industry campaigns. And today, A.G.A. is spearheading an active crusade concerning one of the nation's most serious health problems—heart disease.

Working in conjunction with the American Heart Association and *Woman's Home Companion* magazine, A.G.A. is promoting a revolutionary new kitchen. 'The Heart of the Home.' Designed particularly for women with heart conditions, the kitchen is based on the most modern work simplification principles. Arrangement of work space, range, refrigerator and cabinets at the most convenient height and location keynote the kitchen's basic plan.

On a national basis, the programme of promoting these heart kitchens by local utility companies is still in its early stages. In a little more than a year, however, A.G.A. and American Heart Association have already accomplished wonders. A full-colour sound slide film produced by A.G.A. was a major contribution. The film, based on the original Heart-Saver, is a powerful demonstration of how women can arrange kitchen work to avoid adding new burdens to injured hearts. To date, over 150 copies of the slide film have been circulated to member gas utilities, and have been shown to thousands of audiences. The main purpose has been to set up consultation services to which physicians can refer cardiac women for assistance. Over fifty Heart of the Home consultation services have now been established, and scores of A.H.A. affiliates co-operate with gas utilities to conduct educational programmes. (*A.G.A. Monthly.*)

* * *

### *A SERIOUS EXPLOSION*

A FREAK accident occurred in Rochester, N.Y., on the afternoon of Friday, September 21, setting off a series of explosions in the Brighton section of the suburbs. Three persons were killed. Sixteen homes were completely destroyed and 24 others damaged.

The Brighton area is served by a low pressure system, with a series of four master regulators housed in the vault to reduce the transmission pressure of from five to 15 lb. to ½ lb. Officials of Rochester Gas and Electric Corporation have pointed out that the exact cause of the disaster may never be determined. One company announcement said:

'No one was working in the vault, although some contractors were repairing the sidewalk near the vault, at the order of the company. The men had completed their work, lighted flares for the night and were leaving the job when the vault exploded . . . it is possible that the regulator vault may have contained a combustible mixture and was ignited by one of the flares through the vent maintained in the vault. The roof of the vault was blown up and fell back on top of the regulators which normally would close in case of trouble. The weight of the roof forced the regulator arms into the open position and gas pressure of from five to 15 lb. was introduced into the low pressure system. This high pressure in customers' homes caused leakage which was ignited by various means.'

At a hearing held by the Public Service Commission in Rochester, it was pointed out that the company is installing automatic regulator shut-off valves in all the homes in the Brighton area. (*American Gas Journal.*)

* * *

### *NEW PIPELINE*

ANOTHER natural gas pipeline has been completed to serve the northern and eastern sections of the United States. Trunkline Gas Co., a subsidiary of Panhandle Eastern Pipe Line Co., has announced completion of its natural gas pipeline from Texas and Louisiana to a junction point with Panhandle a short distance from Decatur, Illinois.

The new line will bring from the Gulf area 250 mill. cu.ft. of natural gas a day, adding to Panhandle's supply for customers in the north and east. Trunkline Gas supplements Panhandle's east-west line, bringing daily system capacity to 850 mill. cu.ft.

The new line, built at a cost of more than $80 mill. was completed 30 days ahead of schedule. Contributing to the speed was the use of a weather reporting service which enabled the scheduling of work at times when operations in the affected area might have been suspended. Communications over the line are by microwave radio.

More than 250,000 tons of steel were used in the trunkline connection, adding up to 1,300 miles of 26 in. and 24 in. pipe. (*A.G.A. Monthly.*)

* * *

### *ALL-PURPOSE GENERATOR*

ROCHESTER Gas and Electric Corporation has placed in operation a Koppers-Hasche unit to manufacture city gas ranging from 300 to 1,050 B.Th.U. The unit is a demonstration plant with capacity of more than one million cu.ft. of gas a day. It is capable of using gasoline, propane, butane, light oil or natural gas as raw material.

This is the first plant in the country for the thermal break-down of natural gas for service use in city mains. The process doubles the amount of gas which it receives by breaking it into a lower-heat-content gas through partial combustion in a special furnace. (*A.G.A. Monthly.*)

### *REFRIGERATOR TROUBLE IN NEW YORK*

A SPECIAL check on gas refrigerators in New York City has resulted in the condemnation and sealing off of 80% of the old water-cooled models inspected by the Department of Health.

The assistant health commissioner reported that 264 out of 330 inspected water-cooled models were defective. He estimated that between 60,000 and 70,000 water-cooled units, most manufactured more than 18 years ago, were in operation in the city.

There are also about 250,000 air-cooled gas refrigerators in New York. Both types would be checked in the department's drive. The department's efforts are now to get these water-cooled models replaced through co-operation with tenants, landlords, utilities, and the refrigerator sales companies.

Servel, Inc., have announced that they will supply no more parts for the obsolete water-cooled models except in cases in which utilities have service contracts with owners. They are also ready to replace until further notice, at wholesale prices every Servel refrigerator—water-cooled or air-cooled—that has been in operation 15 years or more and is now in use on the lines of the utilities serving the Manhattan, Bronx, and Wards 1 and 3 of Queens, which abandoned seven years ago the responsibility for servicing appliances. (*Gas Age.*)

* * *

### *GAS INDUSTRY TRENDS*

SALES of the gas utility industry totalled 11,301 mill. therms in the second quarter of 1951, or a rise of 11.8% over sales of 10,106 mill. therms in the similar period a year ago. Sales of gas to domestic consumers rose 8.6% to a total of 3,512 mill. therms in the quarter ending June 30, 1951. Industrial sales increased from 5,672 to 6,454 mill. therms, equivalent to a gain of 13.8%. Commercial sales advanced from 919 mill. therms in the second quarter of 1950 to 972 mill. in the current quarter.

A total of 24.5 mill. customers were served by the gas utility industry on June 30, 1951, representing an increase of 4.4% over the corresponding figure in 1950. Domestic customers totalled 22.7 mill., equivalent to an increase of 4.5% over the 21.7 mill. in the quarter ending June 30, 1950. Commercial and industrial customers were up 3.0 and 4.2% respectively. (*A.G.A. Quarterly Report.*)

* * *

### *STATISTICS*

WE Americans tend to place too much faith in figures. You recall the sad story of the man who drowned crossing a stream that averaged only two feet deep!—*Henry J. Taylor, economist.*

# REFERENCES AND EXPERIENCES RELATIVE TO GASWORKS FOUNDATIONS*

By A. G. BIRD, M.I.Mech.E., M.Inst.Gas E.

THE importance of foundations to carry without movement the modern compacted plant, with its greater point loading, is worthy of reflection, particularly in view of the difficulty in obtaining new and expensive plant, which demands that every care should be taken to ensure its proper installation and thus avoid damage due to faulty foundations.

The siting of gasworks has generally been governed by the lowest level relative to the area of supply regardless of the suitability of the ground, and owing to the cost of transferring an entire works the engineer is often forced to extend on what may be an unsuitable site for heavy loading unless every care is taken and modern experience relative to foundations utilised. Even when new works are envisaged the siting is not entirely in the hands of the engineer, who may be called upon to design and erect his new works on areas underlain with poor load bearing strata and thus unsuitable for the heavy point loading of modern gasworks equipment, unless carefully designed foundations are used. It is therefore necessary for a close investigation by soil mechanics and ground survey to be made in conjunction with the experienced design for the foundations. The position of the site itself is very largely determined by the problem of material handling to and from the works.

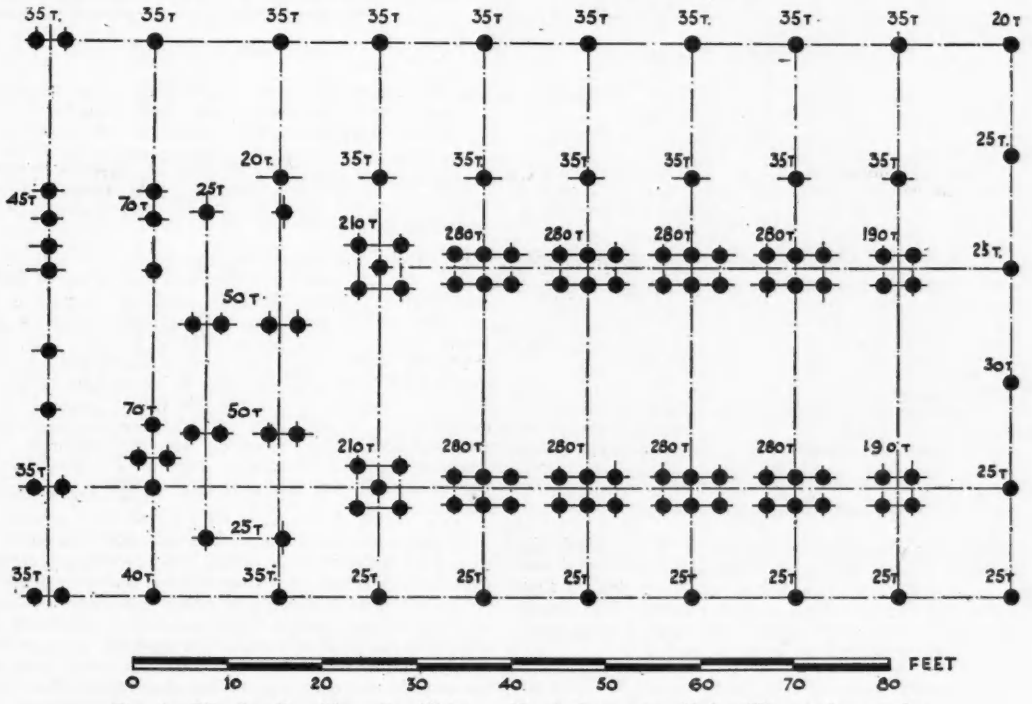


*Fig. 1.—Pile Loading Plan, St. Albans. Nominal capacity 3½-4 million cu.ft. per day.*

To give some idea of the point loads that have to be borne in restricted areas by the foundations, I would refer to the St. Albans vertical retort plant constructed in 1947, of which the loading plan is shown (Fig. 1).

Some 30 years ago water gas plants of, say, 80,000 cu.ft. per day required foundations with point loads of 30 tons. Now under construction in the North of England, the foundations for a water gas plant show point loads of 250 tons, but 150 tons is more general, and it will be appreciated that even this lower tonnage is sufficient to warrant careful design of the supporting foundations.

A reinforced concrete building now in course of construction in the South, to house water gas plant, coke storage and handling plant, and other accessories, has point loads as great as 800 tons.

## Soil Mechanics

The foundation engineer prefers level sites with strata of uniform depth and consistency to uneven sites underlain with varying and doubtful strata, and particularly uncharted filling or old submerged works. The condition of strata is affected by variation of underground water level, which water may be polluted. It therefore follows the type of foundation to be employed must be ascertained by an investigation now available based on the results of research by soil mechanics and by a careful examination taken at various points of the proposed site by borings and trial holes. The art of soil mechanics avoids the possibility of being misled where clay or silt of dubious quality is encountered.

Briefly, in soil mechanics all soils, excluding hard rock, are classified under headings as either cohesive or granular. The cohesive section contains the clays down to zero friction; the granular series are the sands and gravels which are definitely frictional. Between the two extremes an infinite gradation exists.

Standard methods of examination endeavour to determine the position a sample occupies on the soil mechanics chart, and ascertain its potential function relative to any proposed foundation. Much has been published on this matter which

* Paper presented to the Eastern Section of the Institution of Gas Engineers, October 31, 1951.

is of paramount importance when irrigation and banking projects and extensive new sites are being studied.

For gasworks practice the possibly more domestic method of trial holes, visual examination and previous experience of the site or surrounds is accepted, but increased point loading is a warning to take every care.

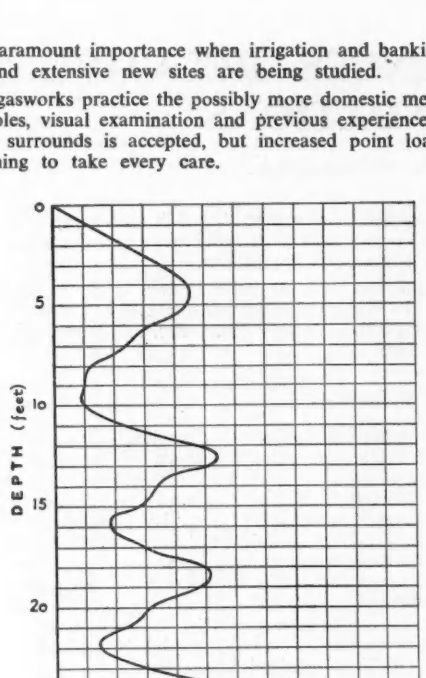


*Fig. 2.—Site at Llanelly.—Graph showing several varying load-carrying zones before that finally accepted.*

Test piling, unless carried out on a full scale method, though helpful may not be entirely accurate; small type test piles may give a result not relative to the actual practical piling method it is proposed to employ.

I would always recommend a series of boreholes supplemented by several trial holes in which the depth and character of the strata underlying the proposed site may be skilfully and carefully examined. The nature of the foundations will be determined by the preliminary investigation outlined above. If a stratum of good clay, compact sand, balast or rock exists at a reasonable distance from the surface—say, not more than 8 ft.—ordinary spread footings of plain or reinforced concrete will suffice. In this connection there is a serious danger to be avoided in that it is possible for a firm stratum to be underlain by a weaker and unsuitable stratum. For this reason it is advisable that two or more of the boreholes be taken down some distance deeper than the others.

Examples of varying soil resistance are shown graphically in Figs. 2 and 3. The graph taken during piling on the site at Llanelly shows several average bearing layers before that suitable for the required loading was reached. The graph of the site at Hackney shows how a false load-carrying zone may occur. This zone had to be penetrated.

## Rafts

When the area covered by the proposed structure is not too great and a suitable load bearing stratum not to deep, then the employment of a raft construction may be considered, but it is essential that the loading on the raft be equally distributed not only on completion of the work, but during the erection of the proposed structure.

## Piles

Should the top strata consist of fill, weak clay, or thin layers of ballast interspersed with clay, then piles are the most suitable foundation. Piles can be either precast or cast *in situ*. For the cast *in situ* method the piles may be either bored or composed of built-up shell increments. The precast pile is favoured where the bearing stratum is a uniform depth and a suitable length can be predetermined. Reinforcement in precast piles must be such as to allow the pile to be manipulated horizontally above ground without detriment to the pile

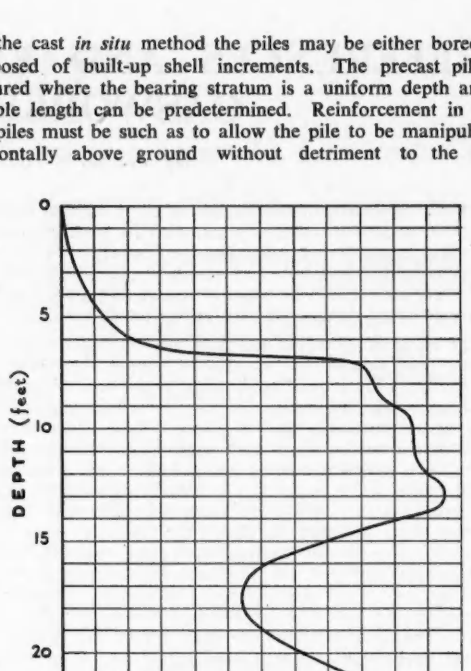


*Fig. 3.—Site at Hackney.—Graph showing good load-bearing zone underlaid with weak deposits.*

structure. It is desirable that care be taken to fabricate the precast pile of sufficient length to avoid addition by scarfing, and a frame capable of driving the longest length of piic is advantageous (Fig. 4).

The bored pile necessitates removal of the soil and weak bearing deposits within a tube, which tube is forced down to a load bearing stratum. Suitably prepared concrete is poured into the tube around the reinforcement, which is inserted after boring is completed, and during this time the steel tube is steadily withdrawn. This method allows piles of varying lengths to be cast *in situ* and for the concrete to be unstrained during the development of the pile within the steel tube. As the bored pile is cast while the steel tube is being withdrawn and the concrete is therefore wet, it is desirable to use specially prepared cements in soils of a deleterious nature. Fig. 5 shows the comparatively simple piling equipment required.

The shell increment system allows a pile shoe to be driven by a steel mandrel on to which are threaded precast sections until the shoe obtains a toe resistance at whatever depth it may occur. the length of the pile being immaterial as increment sections are easily added. The mandrel is withdrawn without disturbing the shells, the skin friction which has been built up during driving being retained. The final total load bearing potential is not only that of the skin friction, but also that of the resistance of the driven toe. As with bored piles a reinforcing steel cage and liquid concrete is then introduced, so forming a homogeneous pile within the precast shell which remains in position as the outside casing (Fig. 6).

The calculations for load bearing capacity of the increment shell pile are based on the Hiley formula, a typical example of which is given:—

| | | |
|---|---|---|
| Type of outfit | ... ... ... | Mobile—Long Mandrels |
| Working load of pile | ... ... | L =60 tons |
| Factor of safety | ... ... ... | =3 |
| Driving resistance | ... ... | R =3 × L=180 tons |
| Weight of hammer | ... ... | W =3 tons |

Drop of hammer ... ... h = 33 in.
Diameter of pile ... ... = 17½ in.
Length of pile ... ... ... l = 30 ft.
Weight of pile and mandrel ... P = 3.55 tons
Coefficient of restitution—cast iron to wood:—
assume ... ... ... ... e = 0.32
Temporary compression of dolly and ground (from past experiments) ... ... ... ... $C_1 = 0.001R = 0.180$ in.
Temporary compression of pile... $C_2 = 0.173$ in.
Total temporary compression ... $C = C_1 + C_2 = 0.353$ in.

Then according to Hiley Formula,

$$S + \frac{C}{2} = \frac{W.h}{R} \times \frac{W + Pe^2}{W + P}$$

$$S + \frac{C}{2} = \frac{3 \times 33}{180} \times \frac{3 + (3.55 \times .32^2)}{3 + 3.55}$$

$$= \frac{99}{180} \times \frac{3.36}{6.55}$$

$$= 0.282 \text{ in.}$$

Set:—$S = 0.282 - 0.177 = 0.105$ in.—*i.e.*, 10 blows to last inch.

Advantage can be taken in all systems by using cements which suitably resist the effects of erosion. The increment shell pile needs special cements only for the casing as the core is protected by the precast shell. The Building Research Station Digest No. 31 published in June, 1951, refers to the special treatment of concrete to resist attack by sulphate bearing clays and ground waters, and I feel it is better to refer the Members to the Building Research Station, as soil contamination has its own particular characteristic.

## Water

The presence of water increases the difficulty of underground construction, particularly where the water level varies. Water must be kept under control during construction of the foundations, and avoidance of the danger of flotation—which is very real—entails extra thicknesses of walls and possibly anchorage by piles. An example of this is shown later in connection with the construction of a coal breaker pit in the North East area (Fig. 8).

## De-watering

If the presence of a considerable quantity of water is indicated the level may be kept down by well-pointing or de-watering. This is the procedure whereby the level of the water surrounding the proposed construction is temporarily lowered while the mass concrete foundations or piers are constructed. A case in point is that which followed investigations of the soil and water level conditions surrounding the site of a continuous vertical retort bench in Scotland. Test holes revealed the presence of water, and of a stratum of fine sand the displacement of which may have affected adjacent buildings and existing retort benches. Piling was considered unsuitable because on the one hand there would have been a negligible penetration into the load bearing substratum, which consisted of granite, and on the other hand the piles would have received little lateral support from the loose texture of the sub-soil above the load bearing level. Mass concrete piers were recommended, but their construction necessitated the removal of the water without displacing the running sand. Recent development of the well-point system of lowering ground water level has provided useful technique for the solution of such problems as this. The typical diagram (Fig. 7) shows a number of well-points taken down to the appropriate depth at intervals of about 3 ft. round the foundations. These well-points are sunk by water jets at 100 lb per sq.in. pressure. The tops of the well-points are connected to a 6 in. main, and to indicate the size of the plant required, equipment in duplicate was provided to deal with 52,000 gallons of water per hour; each unit requiring power from a 30 h.p. Diesel engine. It is important to note that nothing but water is withdrawn. It also prevents the sand from running as there is no upward flow in the sand. In this connection it is interesting to note that 'submerged' sand is in a condition of maximum density so that the withdrawal of water only cannot adversely affect its stability.

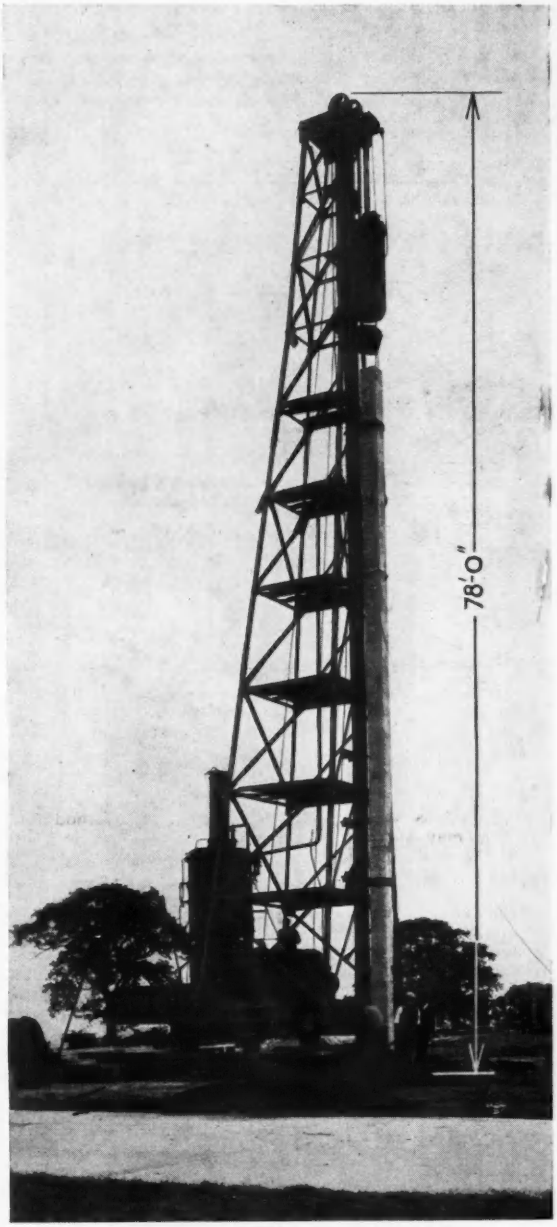


*Fig. 4.—Steam-operated pile frame for driving pre-cast concrete piles.*

It is of interest to note that a similar method was employed in connection with the foundations on the Festival of Britain South Bank site, a description of which appeared in the 'Engineer' of August 12, 1949.

The removal of water by pumping from deep sumps within the construction itself carries the danger of the critical hydraulic gradient between the standing water level and the bottom of the construction being exceeded, and the condition known as 'running sand' may occur. To obviate this risk it is advisable to encase the area within which the proposed

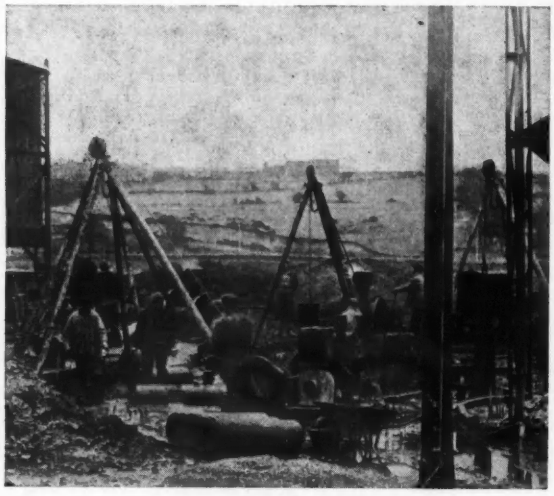

*Fig. 5.—Bored piling in progress.*

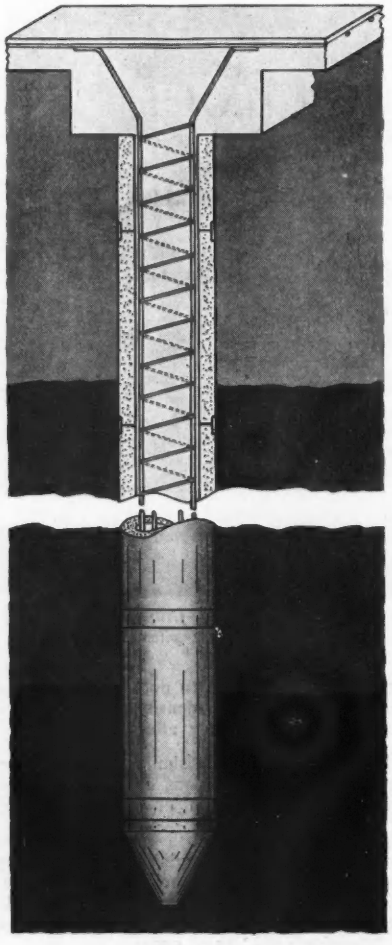

*Fig. 6.—A completed Shell Pile (in part section) with pilecap.*

structure is to be constructed with close steel sheet piling, driven below the bottom of the excavation—the steel piling may be withdrawn on completion of the construction.

## Breaker Pits

The tendency for designers to conceive coal breaker pits of complicated reinforced profiles and pockets increases the problem considerably. From the point of view of a constructor of foundations it is a desideratum that all pits should be of regular shape, either rectangular or square, and the necessary supports for the machinery, etc., built-up from a straight-sided and flat-bottomed pit. The object of this is to ensure a dry pit, even if such building-up requires the structures to be specially treated against erosion or the addition of concrete pads and blocks, which can be formed after the more regular shaped pit is built. Where unbroken coal is elevated from the receiving point within the pit to above-ground breaker pits of lesser depth are required and this is an advantage both in construction and in maintaining the desired water-tightness.

Experience has proved it is very much easier to construct pits of symmetrical design and ensure against leakage, which when it starts, is difficult to overcome and in the long run it is the dry pit that pays. An example of a rather complicated design is shown in Fig. 8.

## Cements

Cements should conform to British Standard Specification, and I cannot do better in this short address than refer to the booklet 'Concrete Practice,' issued by the Cement and Concrete Association, which gives a very clear statement on how to deal with cements together with a list of British Standard Specifications for cements, etc.

For gasworks practice, where we may have contaminated ground and varying load-carrying subsoils with more than usual temperature variations, I believe the solution is slow hardening cement, well designed clean and strong reinforcement with first-class sand and aggregate, coupled with a careful control of the concrete water content.

Cements for water-proofing, sulphate resisting, and rapid hardening are proprietary and come within the scope of the specialist, but there is without doubt an advantage in using such cements, at the right time only. Water-proofing may be assisted by protective coatings over the concrete of tar, bitumen or synthetic rubber, but such coatings may give out before the life of the concrete and the final result depends on the quality of the original concrete.

## Pre-stressing

The introduction of pre-stressing is interesting. The usual steel reinforcements are replaced by high tensile steel wire which is stressed within the concrete as it is placed. The final beam or structure on completion is under compression due to the stress of the wire. As the member is loaded any tension induced has to overcome the initial compression in the concrete. It is usually arranged that, within the working range, any such tensile stresses are lower than the pre-stress compression; hence the concrete is *never* in tension throughout the working loads. This does appear to make less probable the possibility of cracking and fissure formation.

A paper on 'The Application of Pre-stressed Concrete to Structural and Building Work in the Gas Industry' by Mr. S. V. Gardner, which was presented at the Research Meeting last year, gives an excellent impression of the possibilities of pre-stressing concrete in gasworks application. The ten important points set out in Mr. Gardner's conclusions deal with the general aspect admirably, although I would take some exception to the possibility of the application on the site of pre-stressing being cheaper than the standard reinforcement design. I thoroughly endorse the great care required and the specialist labour that must be constantly available when pre-stressing. The highly competitive nature of reinforced constructions does not allow for the attendance, on average jobs,

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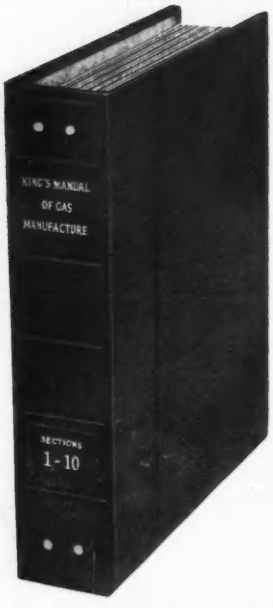


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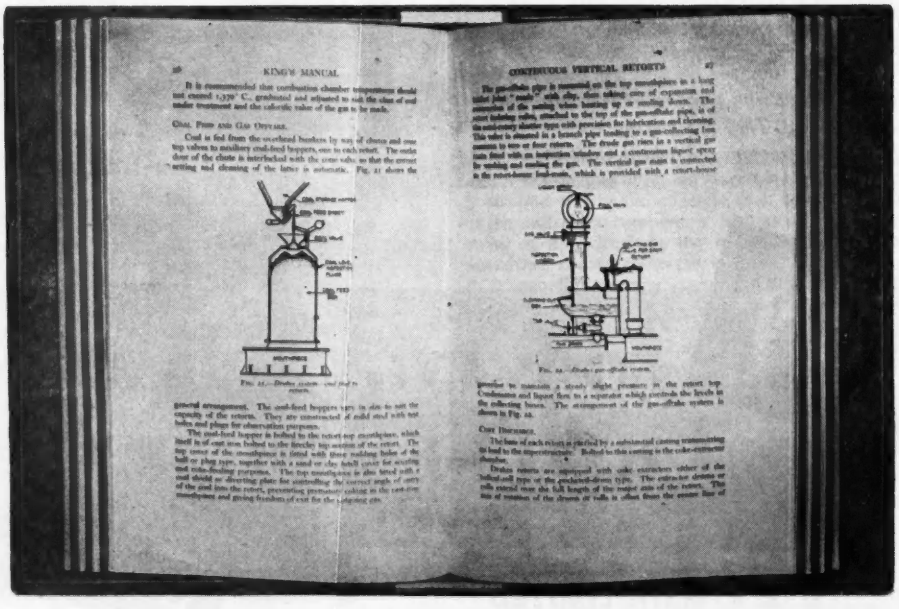

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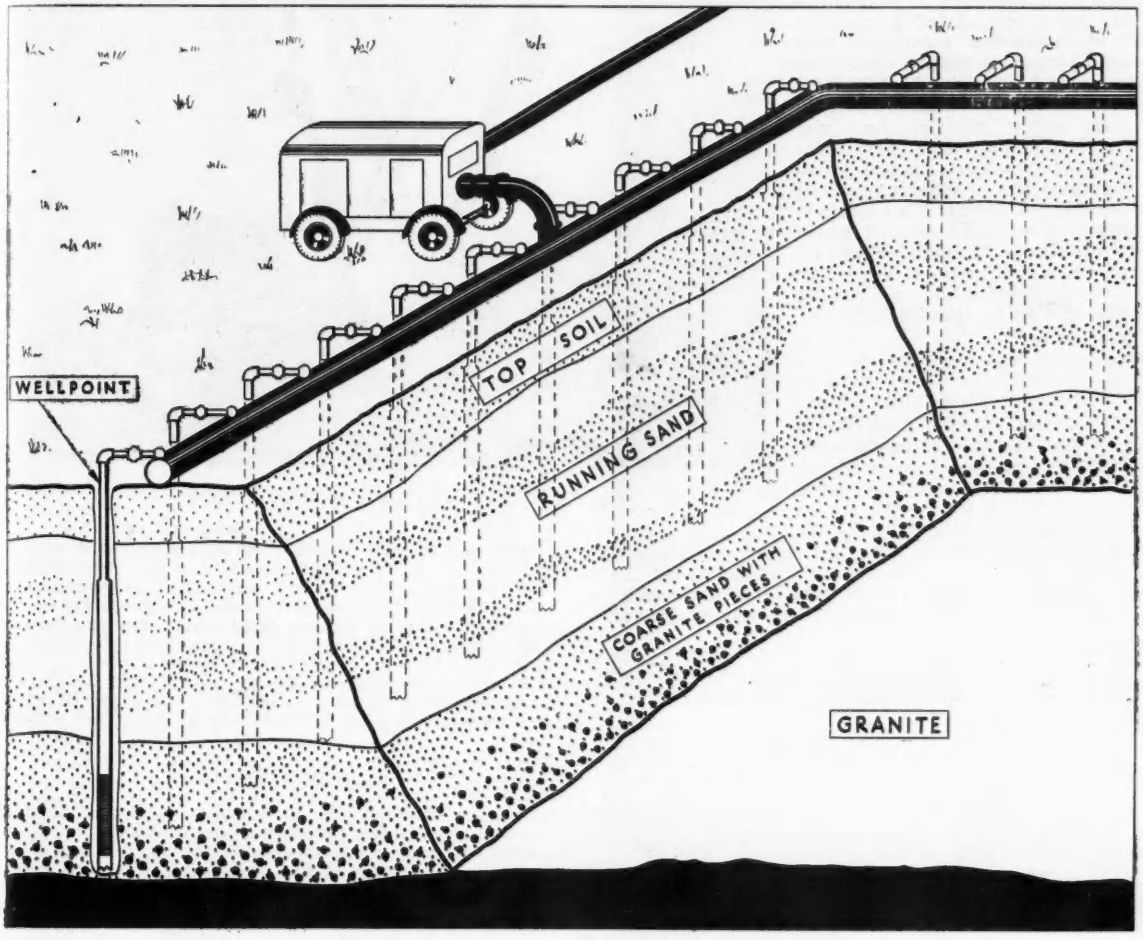
of a resident trained technician. For precast units such as railway sleepers and quantity produced floor beams which carry alternating stresses the method is ideal. Pre-stressing certainly seems to be receiving more favour in connection with the construction of square and round tanks.

Pre-stressing appears to reduce the weight and section of steel required and thickness of concrete. Many theoretical advantages are claimed, but we have not yet had in the gas industry an extended practical experience of its application. I am rather apprehensive that the reduced thickness of concrete cover may be more quickly penetrated by contamination usually found within the precincts of gasworks, and this must be specially guarded against, particularly when pre-stressing of concrete is considered in connection with underground tanks, etc.




*Above: Fig. 7—Diagrammatic Example of Well-Points.*

*Left: Fig. 8—An example of complicated design.*

The pre-stressing of piles applies with most advantage to precast piles which have to be manipulated above ground horizontally and the pre-stressing may ensure less possibility of cracking before the piles are actually driven.

## Lateral Strains

In the case of driven piles the toe or shoe is forced into the load bearing zone and if the top soil zones are of poor cohesion then the tops of the piles are tied transversely and longitudinally to deal with any lateral strains, which in practice are small. The displacement and compacting of the soils by the driven piles increases the passive resistance and in fact this has to be considered in programming the

sequence of pile driving, particularly for heavy point loads which require groups of piles.

I have always thought that the lateral support given to driven piles by the soil has been under-estimated, and I was interested to note that in the American Code of Practice for Piling, unless the surrounding soils are approaching fluidity, the driven pile may be considered as a short column. Although naturally, over the many years of piling practice carried out in England there have been cases of subsidence—unusual lateral movement of a structure is practically unknown. However, it is possible to introduce a bending moment into a driven pile by the impact of the shoe on a rock formation which may exist at a steep incline and so divert the pile toe from the intended centre line.

## Summary

I appreciate the privilege of presenting a few notes on foundations, as experience shows it is of increasing importance to study the foundation problems for the heavier plant and machinery of modern design. A small movement of the foundations under a retort bench or under any mechanical construction may seriously affect the efficiency and life of the installation. Even in the case of retort benches the already much abused retorts themselves may be affected.

As expenditure on foundations is non-revenue producing, there is a natural tendency to economise in this direction and overlook the valuable insurance of a firm basis.

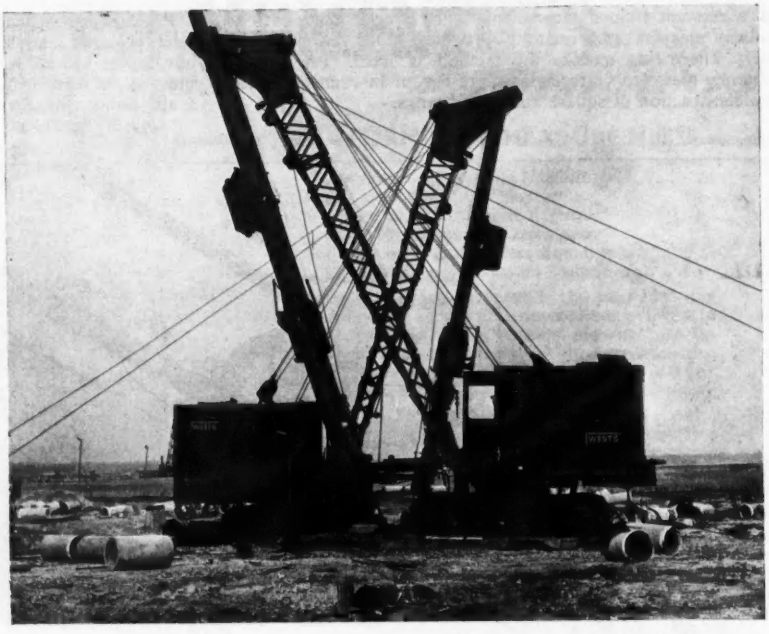


*Fig. 9.—Mobile Raker Piling Machines at Fawley.*

# DISCUSSION

**Mr. R. F. Robinson** (Watford) was a little disappointed that the author had not discussed more fully the relationship between settlement of foundations and the engineering calculations conventionally used to determine safe bearing capacity. Perhaps he was fortunate in having little experience of the former and complete confidence in the latter. A great deal of work had recently been published on this subject, and while for the majority of soils the conventional engineering design methods were satisfactory, this was not true for subsoils of sand, silt, or clay; and one was forced to the conclusion, in his own case very reluctantly, that the engineer alone was not competent to design foundations based on those subsoils. Only those with knowledge of soil mechanics and with full information based on soil samples from borings were able to determine the most economic form of foundation which would not be liable to undue settlement.

There was a popular misconception that settlement was not encountered in piled foundations if they were properly designed in accordance with recognised formulæ. This was certainly not true, and in deep beds of clay massed piles were known to settle in a similar manner to a massed concrete or raft foundation at a depth equivalent to the pile length. Mr. Bird had given the Hiley formula as a basis for calculating the load bearing capacity of piles. He thought it should be stressed that such formulæ furnished no more than an approximation, usually on the high side. In fact, for groups of friction piles the total safe load was quite different from the sum of the safe loads of the individual piles as determined by loading tests. A further point was the effect of water squeezed out of clay which reduced skin friction considerably. This was often re-absorbed with an increase of sometimes two or three times the bearing capacity of the pile. In compressible subsoils, particularly clay, the limiting factor in determining the load was invariably the liability to settlement and frequently the design based on settlement considerations had a factor of safety greatly in excess of that normally accepted.

Early in the paper Mr. Bird had suggested that should the top strata consist of fill or weak clay then piles were the most suitable foundation. He felt it was difficult to generalise on such conditions, since much depended on the loading on the subsoil, and whether the loads could conveniently be spread or otherwise, and whether the soil was consistent throughout the area of the site. If loads could be spread conveniently and if excavation presented no difficulty, a raft might well be the cheapest satisfactory design. Here again the degree of settlement which could be tolerated was probably the decisive factor.

## Expensive Procedure

With regard to test piles, it was always understood that this was a very expensive procedure, and he wondered if the author had had experience of the method of testing by hydraulic jack retained in position by a beam attached to two adjacent piles—known, he believed, as the 'shoe-string' method. In Mr. Bird's opinion was such a method reliable? The account given of the methods of ground water lowering by well pointing or de-watering was interesting, but it would have been helpful if some indication could have been given of the cost of such methods. Referring to the vibrationless piling at New College, Oxford, the author had not stated the nature of the subsoil presumably this was clay superimposed on a bed of hard chalk. Mr. Robinson stressed the need for comprehensive records to be kept on all foundation work in an effort to bridge the wide gap which existed between theoretical soil mechanics and practical foundation design.

**Mr. E. O. Rose** (Divisional Engineer, Tottenham) supported Mr. Bird's views regarding water control in concrete piles and foundations or any other kind of concrete work. The whole art of making concrete lay in the control of the mix, not only in regard to water but in the quality of the aggregates as well. He would always like to be able to specify that aggregates and water should be weighed in batches. There were batch weighers on the market now; some contractors had them, and he looked forward to the day when all contractors would use them. He did not know whether Mr. Bird's company had them or not, but it was one of the first moves which the contracting side of the industry should make towards being able to guarantee controlled mixes.

## Risks of Over-Confidence

Confession was probably a very good thing for the soul, and as a warning to fellow engineers he felt he ought to relate two instances in which he had been caught out through being

over-confident. They might bring home to other engineers the necessity for taking all necessary precautions. In the old Tottenham Company they had a number of sites up and down the Lea Valley. He had been associated with them for 30 years, and some of his colleagues had been there for a similar length of time, and they thought they knew all the different sites. Under those conditions they naturally became a little bit certain of their ground and felt that when questions of piling arose they knew exactly where they were. On one occasion when some coke hoppers were to be put up they thought they had ballast up to within 5 ft. all over the site. They happened to move a few yards and found that they had no ballast at all; then they moved 20 ft. and found some. They also found some liquid chalk which continued to an unknown depth. They had to change their tactics and had to pile the site. They found that the site had been excavated as a ballast pit and filled up with the 'best' foundation material—road sweepings, with a good admixture of paper!

In another case recently, at Harlow, they were mistaken in thinking they knew the site, but the site on which they had to work was a little further up the valley than they had been before, and they were unaware of the ancient geology of the neighbourhood. They proposed to put in a comparatively simple pile foundation. They took the precaution of test piling, and what they found was something entirely different from what their previous experience had led them to expect. No harm was done, except that they had to go back to their Board and ask for another £20,000.

He would like to have Mr. Bird's views on the various methods of test piling used. They had employed a firm which drove a test pile of about 2 in. bore having a mandrel down the centre and an outer skin which was driven separately. It cost about £100 to drive five test piles. He would like Mr. Bird's views as to the reliability of that system. In connection with foundations and underground work he mentioned another method which had been used successfully in the construction of pits. They last used it in connection with a coal crusher pit some 45-50 ft. deep which was constructed at Ponders End, where they had to be careful owing to the inclination to have running sand. The whole pit was designed as a caisson, and the concrete pit became in effect its own shuttering.

**Mr. D. W. Ault** (Divisional Engineer, Lincoln) wondered why the author was so insistent on slow hardening cement when a rapid hardening cement would generally result in economy in concrete construction and a greater measure of safety in working. It gave a very slight tendency to cross resistance and, contrary to what the author had said, it gave a slightly better protection from contaminated ground or ground water. Regarding Mr. Bird's remarks about inadequate site supervision, they suffered in the gas industry from the fact that many of their jobs were small, and in a lot of other cases they were badly placed for technical staff, particularly in these days of technical staff shortages. Site supervision was extremely bad, but he thought it was getting better, and because of that the Cement and Concrete Association was able to provide them with very nice curves and charts from which to work out the right mix for a particular job.

## Pre-stressed Concrete

**Mr. W. A. Evetts** (Divisional Engineer, Watford) related an instance where they had found a ballast layer falling from 8 ft. to nothing over a site 120 ft. long. A rather interesting problem had arisen at Elstree where they had been putting in a holder tank foundation in London clay. The London clay went to a great depth, and although the previous holder had been built on the surface they thought it wise to have ground exploration carried out. One holder had tilted, and on exploration they found that the top 10-12 ft. of clay had changed to a condition in which it was not competent to take the loads. They had to build over the site of an existing small holder which went down to a depth of 20 ft., and at 10-12 ft. they found they had a very good bottom. Their experience led them to consider the question of pre-stressed concrete tanks. He felt—and he thought everybody who had taken the trouble to investigate the matter would agree—that there must be a great future for pre-stressed concrete. It was ideal for tanks, and they had found that on the matter of costs there was not a great deal of difference by the time they had taken into account their expensive pile foundations. A complete pre-stressed concrete tank was quoted at £69,000, against £67,000 for a reinforced concrete tank with steel tank on piles—a difference of only about £2,000. In such cases he suggested that they must seriously consider pre-stressed concrete in future.

**Mr. B. Clarke** (Divisional Manager, Lincoln) remarked that on the question of supervision they did get, in his division, test cubes of all concrete work so that they could be reassured on that question.

## Experiences at Cambridge

**Mr. E. H. Winch** (Divisional Liaison Engineer, Cambridge) said that some years ago at Cambridge it was decided to install a new tar plant. The site selected was adjacent to two old tar plants which had been erected on a mass concrete foundation about 20 or 30 years ago. It was decided to erect the new tar plant on a similar mass concrete foundation, the subsoil consisting of well consolidated made up ground principally consisting of spent lime from old purifiers. The loading on the foundation was quite small, being less than half a ton per sq. ft. Next to it a pump house was erected and between it and the concrete raft there was a deep concrete sump used for collecting condensate from steam traps and other hot waste water. The plant was erected in 1940, and in 1946 it was observed that the raft on which the still was built had tilted down at one corner to the extent of 3 to 4 in. This was found to be due to the concrete sump having fractured and hot water escaping from it had washed away the lime subsoil. It was decided to level up the still foundation and the following method was adopted. Four Franki piles 18 in. by 30 ft. deep were sunk, one at each corner of the concrete raft in line with two sides. Two reinforced concrete beams 2 ft. wide by 2 ft. 3 in. deep were then constructed under the sides of the raft, the ends of the beams being cast integral with the piles on the low side of the raft. On the other side wedges were inserted between the inside of the beams and the top of the piles. The ground was then taken out from under the raft by excavation and by washing with water jet. The wedges were gradually removed and the raft let down to the new level. The operation was successful and the raft was restored nearly to level position.

About two years ago, a new water gas plant was to be erected at the opposite corner of the works where the subsoil was known to be similarly made up. They carried out preliminary tests with an unconfined compression testing apparatus, but the results found were very discouraging. An overall compressive strength of 0.25 tons per sq. ft. was indicated at 7 ft. below ground level while 4 ft. lower the compressive strength varied from 0.25 to 1.34 tons per sq. ft. In view of this, a firm specialising in soil surveys was called in, and two pairs of bores were made to a depth of 60 ft. at opposite corners of the site at a cost of £168. In each pair of bores, one showed a safe bearing value of one ton per sq. ft. at 6 ft. depth and the other a negligible bearing value at the same depth, thus indicating the extreme variability and unreliability of the ground. Finally it was decided to use bored piles with enlarged bases driven to depths of 40-50 ft.; 40-ton type piles were used, although the loading was only required to be 20 tons. As boring proceeded a good base was found at about 22 ft. depth where blue clay was reached. The bores were carried 8 ft. down into the blue clay. In order to make quite sure, one pile was selected for a loading test of 30 tons—namely, 50% overload. The test was quite satisfactory, showing a final settlement of 0.0175 in. This was an example of the difficulty of making soil tests on a variable site and of the necessity for careful examination of site conditions during foundation construction. Eventually 88 piles were used, the total boring being 2,728 ft. compared with the original proposals for 3,960 ft. The cost of the load test was £220, but after allowing for this the total saving by the reduction in total boring amounted to approximately £1,800.

## The Author's Reply

**Mr. Bird,** replying to the discussion, left the more technical points to his friend Mr. W. Hughes. His general answer to Mr. Robinson's remarks about raft settlement was that the raft should be loaded so that it did not tilt. Pile testing by adjacent piles was a somewhat tricky process. They did a lot of it, but they had to be very careful that they did not withdraw the pile that was being used as anchorage. Answering Mr. Rose, Mr. Bird said water content was not everything. It was natural to expect that all concrete mixing nowadays would be by mechanical plant which would ensure the almost continuous character of the actual mix if the ingredients were added in the proper proportions. Whether the ingredients were added by weight or by volume was a question of the size of each particular job. Batch weighing was better than measurement by volume for small jobs. All this Company's pre-cast jobs were carried out by batch weighing nowadays.

On the question of test piling, it was quite possible with test piles of the dimensions mentioned by Mr. Rose to get some information about the resistance of the soil, but he was at a loss to see how information obtained in such tests could be correlated with actual piling conditions. In practice they found in their piling on sites that differed widely, employing piles of 14½, 17½, and 20 in. diameter, that they had to be very careful how they intermixed them. In answer to Mr. Ault, Mr. Bird said his Company favoured slow hardening cement for tank pit work and for most gasworks structures because it was less liable to cracking and fissure formation. In reply to Mr. Evetts, he did not deride pre-stressing, but he had some misgivings regarding its use for certain gasworks structures as against ordinary reinforcement, even with skilled labour. Reference had been made to test cubes; he was all in favour of their use. They had a man going round to different jobs taking samples of the concrete from time to time and sending in test cubes to their testing department, which had a professional team of investigators into concrete.

**Mr. Hughes,** supplementing Mr. Bird's reply, said soil mechanics, like psychiatry, was one of the more important modern sciences, and for the first time the texture of soil was being scientifically investigated and its properties were being described and enumerated. The soil mechanics experts had, however, investigated problems of settlement and had produced rsults which, so far as he could see, were not much use. In a recent investigation on gasholder settlement they had been told that the settlement might amount to as much as 9 in. in 10 years. In another instance of ground bearing capacity where he had been asked what the ground would carry, he had reported, after investigation, that it would carry three tons per sq. ft., but the soil mechanics experts came along and put it at only 0·74 tons per sq. ft.

As to the settlement of piles he did not think anyone could guarantee absence of settlement unless the site were very good ground, such as ballast, compact sand, or rock. If he were asked to design a structure and to please himself whether he used a raft here or piles there, provided there was to be no settlement, he would insist that the ground should be piled. In regard to a raft, he could design a raft that would float, but he could not guarantee that it would float on an even keel. He had an experience in the hard winter of 1929 only a short distance from where they were now assembled in which, in conjunction with the architect, it was decided to construct a raft. The ground was explored to a depth of 14 ft. and appeared suitable for the proposed loading. Due to the hard frost digging was very difficult and was not taken below the depth mentioned. The raft and building were constructed in two halves and when, during the spring, the steel frame only of the first part was about half way up, an alarming tilt towards the street developed. A further investigation of the site showed that only a foot or two below where digging had stopped in the winter, was a stratum of peat 4 ft. deep. It was found possible to underpin the raft with bored piles and stop the tilt. The second half of the building was constructed entirely on piles. Rafting was not easy and he would never guarantee it.

He agreed that pre-stressing had a great future. A difficulty in concrete work was to prevent cracking due to shrinkage, and pre-stressing could avoid cracking entirely. To that extent it was very good, but it had a long way to go in small applications and *in situ* work.

A vote of thanks was accorded to Mr. Bird on the proposition of **Mr. R. Whiting** (Divisional Engineer, Ipswich), seconded by **Mr. Ault.**

# TEMPERATURE CHANGES AND GAS CONSUMPTION

By H. MAINWARING, M.C., M.I.Struct.E.,
Manchester Group, Distributing Engineer, North Western Gas Board.

A paper which Mr. Mainwaring gave to the Manchester District Junior Association of Gas Engineers on November 14 was concerned with the effects of seasonal and temperature changes on gas consumption in the Manchester undertaking, the author describing, with reference to graphical diagrams, a method of examining the conditions affecting daily consumption values. The following is the argument on which the graphical interpretation was based. —Ed., *G.J.*

THE hourly and daily consumptions of gas are continually varying and the amounts and causes of these variations require constant examination by distribution and production engineers in order to determine the loads peculiar to each undertaking. These loads, for the purpose of analysis, are classified as static, alternating, and variable in character.

The static or base load may be graduated to a time element dependent on varying local conditions extending to weekly periods, and for this requirement the weekly static load may be assigned daily values. The alternating load comprises volumes supplied to other undertakings and additional quantities requested intermittently by large consumers. The variable load reflects seasonal and temperature changes. It must also be appreciated that the method of examining data to present a correct perspective of load values must follow the established order of statistical analysis.

From a preliminary inspection of data and diagrams recording daily consumptions, the variations occurring with seasonal and temperature changes are readily perceived. Some of these variations are the result of changes in industrial and trade demands, others reflect the sensitive and immediate reaction of the consumer against any change from the normal standard of comfort which occurs with fluctuations in temperature. With these comments in mind the characteristics of each part of the total load may be outlined in the following definitions.

(1) *The Base Load* (BL.) is that portion of the daily consumption which is unaffected by seasonal and temperature changes, and thereby forms the load unit in which appear normal increases in supply. Its value at any period may therefore be expressed as CF × BL, in which CF represents the cumulative factor of annual increase.

(2) *The Alternating Load* (AL.) records only the intermittent volumes supplied to adjoining undertakings and fixed quantities to meet additional industrial and trade demands.

(3) *The Seasonal Load* (SL.) is a variable component changing with the period of the year, and to which a correction factor (K.) for temperature changes applies. The values of the seasonal load and temperature correction factor relative to the data recorded are set out in the Appendix.

(4) *The Total Day Load* (DL.) is the sum of the basic, alternating, and seasonal loads, and in value is: $DL = CF \times BL + AL + SL \times K$, when $K = [1 \pm 0.01(D)^{1.25 - \frac{T-40}{100}}]$ and D=number of degrees variation from a basic temperature of 40°F., and T=temperature in degrees Fahrenheit.

From this division of daily consumption the changes in seasonal load with variations in temperature may be more clearly defined.

Within a mild temperature range (40° to 50°F.) scatter diagrams indicate that the reductions in consumption with rises in temperature are proportional to the increases appearing with similar falls in temperature when compared within a range of 10° above a basic temperature of 40°F. In the higher temperatures of the summer period, however, the rate of change in consumption presents a diminishing value with temperature increases, and as the temperature rises above 60°F. the consumption value approaches a condition of stability. In these circumstances it is self explanatory that the correction factor to relate variations in consumption with temperature changes must be variable in character, and from a close examination of consumption values with the data avail-

able this condition, within suitable limits, may be satisfied in empirical form by relating the index of the correction factor directly with the temperature value. In this form the seasonal load (SL.) corrected to compensate for changes in temperature may within close limits be expressed as:—

$$SL\ [1 \pm 0.01(D)^{1.25 - \frac{T-40}{100}}],$$

in which SL represents the seasonal load value, D = number of degrees variation from 40°F., T = temperature in °F., whence SL is reduced or increased by temperatures above or below 40°F.

It is also observed that with gradual changes in temperature the demand, while following the trend of change, exhibits a time lag, whereas with rapid fluctuations in temperature the change in consumption occurs more speedily.

A comparative instance of seasonal change may be observed in an annual diagram presenting the daily record of hours between sunset and sunrise. The similarity of contour in this diagram with the curve recording change in consumption at like periods of the year therefore offers a provisional standard towards determining the proportion of the seasonal load contained in the total consumption, and by a correction factor this contour may be resolved within near limits to evaluate the seasonal load and thereby ascertain the static or base load component.

It has already been defined that the stable annual increase must appear in the base load; accordingly, the extent to which this increment exceeds the reduction in consumption occurring with the fall in seasonal load at the beginning of each year will determine in part the period during which an increase in consumption will continue into the succeeding year. The remaining part of the increase in consumption appears in the seasonal load due to the temperature in the January period falling to the lowest annual value in the normal trend.

At the beginning of each year the base load values are amended to absorb the annual increment and a relative readjustment is likewise effected in the annual cumulative factor. Adjustment of load is also requisite at holiday periods to suit the prevalent trend of local conditions.

Constant observation and examination of consumption values are essential in every undertaking if estimates of demand are to be predicted with accuracy and applied usefully; particularly are these estimates of service in the winter period when the rapid increases in load which occur with sudden falls in temperature can be assessed and the preparation of plant arranged to meet the increased demand.

Storage capacity and flexibility of plant are also interlinked with the requirements of supply and demand, and where storage is restricted the condition and arrangement of plant must be sufficiently flexible to compensate any shortage in holder capacity if satisfactory supply is to continue, and pressure, without supplementary support, is to be maintained throughout the period of maximum consumption.

The necessary requirements of storage can be illustrated graphically by relating holder capacities with stock reductions between maxima and minima limits, and to indicate the continually varying volume of available stock a careful examination of storage capacity which may result during holder repairs is essential.

In the perusal of these comments and observations it will be appreciated that the conditions affecting consumption differ with each undertaking, and local demands will vary considerably according to the nature of the predominant load characteristics, in which a change is readily disclosed on diagrammatic records.

An instance of variation in conditions does indeed appear in the daily load diagrams, wherein an increase above the normal seasonal load curve occurs from the 14th week. This additional load results from an industrial demand arranged to begin at that period.

The fuel shortage of the past winter was reflected by increased consumptions and an extended period during which higher consumptions continued. In the Manchester undertaking these additional loads were attributed to the consumers' use of all available appliances for heating purposes, which comparable with normal conditions raised the consumption by an amount equivalent to a temperature reduction of 6° below the standard for the period.

At these equivalent lower temperatures the consumption values become similar to the normal loads of the month preceding, and so plotted are coincident with the corresponding period on the load curve. Should similar conditions occur at the beginning of the coming winter an increase in consumption in advance of the normal period may be anticipated.

# WALES AND MONMOUTHSHIRE JUNIORS (NORTH)

ON November 6 some 45 members of the North Wales Section accompanied their Chairman (Mr. J. Woodcock) on a visit to the Nelson Meter Works of Sawer and Purves, Ltd., Manchester. Welcoming the visitors at a luncheon held in the Engineers' Club, the Director and General Manager (Mr. J. P. Smith) said he felt rather proud of the fact that for their first visit to a meter manufacturer, the youngest junior section in the industry should visit one of the oldest meter concerns in the country.

Mr. J. Woodcock, replying to the welcome, expressed the wish that all juniors should avail themselves of the facilities offered by these visits as a means of widening their knowledge of those items of equipment with which they came into close contact during their everyday work.

Following lunch, the members toured the works and were impressed with the accuracy required in the production of tools and die sets for the manufacture of various components. Particular attention was paid to the brasswork section, where the visitors were able to see the manufacture and assembly of main and service cocks, unions and other miscellaneous brass fittings.

In the meter assembly section, the prepayment attachment and index departments were of special interest, and it was instructive to see meters in all the different stages of assembly. The main centre of attraction was undoubtedly the new test office of the Ministry of Fuel and Power, and the visitors were privileged to meet and listen to Mr. G. Glency (Area Examiner for the North West) explaining in detail the technical points of Government meter testing and registration. For this occasion a large industrial meter, enclosed in glass case, had been specially coupled up to a test holder, and a demonstration was given of the actual movement of the valves and diaphragms as the meter was tested.

To round off a most enjoyable day, the members returned to the Engineers' Club for tea, when Mr. Kendrick (Conway), proposed a vote of thanks to Messrs. Sawer & Purves. Seconding the vote, Mr. D. S. Barker (Connah's Quay) thanked the directors and staff of the firm for their hospitality, mentioning particularly Mr. J. P. Smith and Mr. P. Davies, both of whom responded.

*Mr. J. P. Smith (extreme right) speaking to Mr. J. Woodcock, Chairman of the North Wales Section, together with other members on the occasion of the visit to Sawer & Purves, Ltd., Manchester.*

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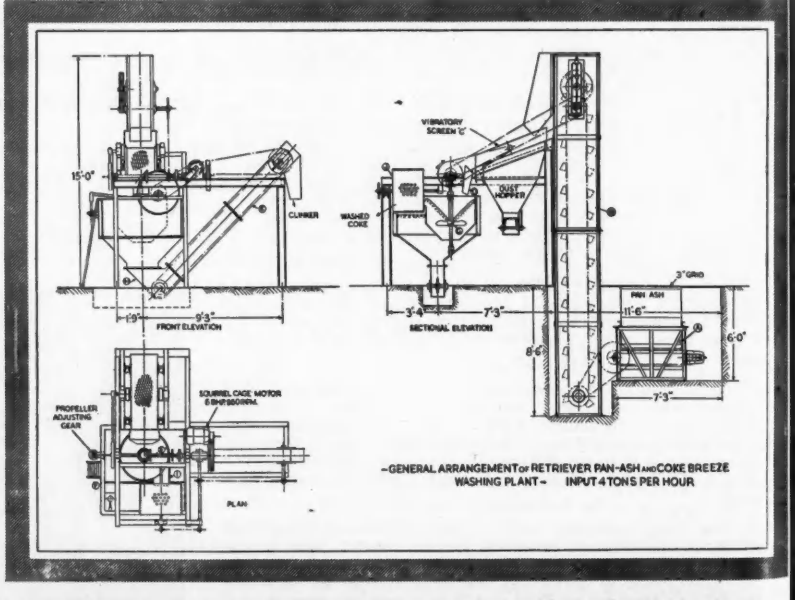


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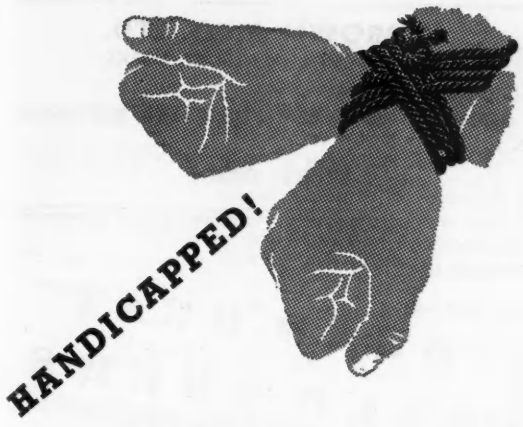


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"We are pleased with results obtained after using ONX Super '83' Brand. "Our settings were very bad, with large cracks in retorts, and portions of wall actually collapsed. "Now, six months after repairing 28 retorts they appear as sound as ever; we anticipate the life of the settings will be prolonged."
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*'Phone:* TEMPLE BAR 9910. *'Grams:* WASHER, ESTRAND, LONDON.

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The "Gas Journal" is published every Wednesday, price 1/3d.; by post 1/5d.

**Subscription Rates :** Home and Empire :- 52/- per annum ; Foreign :- 60 - per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

**Classified Advertisements :** All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

**Displayed Advertisements :** Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide ; block screen 120.

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NORTHERN MANAGER : W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone : Harrogate 84291.

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## APPOINTMENTS VACANT

**RESEARCH ASSISTANTS**—Vacancies in small team working in modern research building on background and applied Research mainly on Chemical Engineering developments. Honours degree Chemistry, Physics or Chemical Engineering. Age preferably around 25. Sound, imaginative approach to problems more important than previous experience. Work involves lively contact with Engineering, Chemical Engineering and Works Departments. Theoretical and Laboratory investigations, Pilot plant design operation and testing followed by full scale plant design. The department is new, with increasing scope, providing good prospects. Temporary allowance granted pending settlement of accommodation. Apply stating age, education, qualifications and experience to : The Secretary, Whessoe Limited, Darlington, Co. Durham.

### WALES GAS BOARD

NEATH UNDERTAKING.

WORKS FOREMAN.

**APPLICATIONS are invited for the position of** WORKS FOREMAN to the Neath Undertaking. Candidates should have had experience in the control of labour and in modern Gas Works practice.

The salary will be in accordance with Intermediate Grade IX (£475-£520 per annum). A deduction of £52 per annum will be made from the foregoing, to cover the tenancy of the Gas Works House (in which the successful applicant must reside), coal and up to 40,000 cubic feet of gas per annum.

The successful applicant may be required to undergo a Medical Examination and to subscribe to such superannuation scheme as the Board may adopt.

Application, stating age, experience, present position, etc., together with the names of two people to whom reference may be made, should reach the undersigned not later than December 5, 1951.

G. FITTON,
Engineer & Manager.

Wales Gas Board,
Neath Undertaking,
Millands,
Neath.

### SCOTTISH GAS BOARD

EDINBURGH DISTRICT.

DISTRIBUTION OFFICE SUPERVISOR.

**APPLICATIONS are invited for the above** appointment.

Candidates should have experience in consumer service, transport, stores practice and job progress.

The salary will be graded A.P.T. XI (Provincial "A") (£645-£770 per annum).

Applications, stating age, qualifications and experience, together with *copies* of recent Testimonials, should be forwarded to the undersigned within fourteen days from the appearance of this advertisement.

The appointment will be subject to the provisions of any Superannuation scheme adopted by the Board and the successful candidate will be required to pass a medical examination.

DAVID BEAVIS,
Divisional Controller.

15, Calton Hill,
Edinburgh, 1.
November, 1951.

### SCOTTISH GAS BOARD

EDINBURGH DIVISION.

CHEMICAL AND ENGINEERING STAFF.

**A NUMBER of vacancies exist at Granton Gas** Works for JUNIOR TECHNICAL STAFF to assist in the chemical and technical control of works processes.

Applicants must be of good General education and have attained, or be proceeding to, National Certificate standards in Chemistry or Engineering.

Salaries will be according to capabilities and experience.

The successful candidates will be required to pass a medical examination and will be subject to the provisions of any superannuation scheme which the Board may introduce.

Applications stating age, training, qualifications and experience should be made to the undersigned within fourteen days of the appearance of this advertisement.

DAVID BEAVIS,
Divisional Controller.

15, Calton Hill,
Edinburgh, 1.

### SCOTTISH GAS BOARD

LANARKSHIRE GROUP—

LANARK COUNTY DISTRICT.

ASSISTANT DISTRIBUTION ENGINEER.

**APPLICATIONS are invited for the above post.** Applicants must be experienced in all branches of Distribution Engineering and Gasfitting Work, including the control of outside staff and the preparation of schemes for the extension of the existing mains system. A sound knowledge of H.P. work is necessary, together with a comprehensive practical experience in all departments of Distribution, Supply and Service.

Preference will be given to applicants possessing the Higher Grade Certificate of the Institution of Gas Engineers in Gas Engineering (Supply) or equivalen qualifications.

The salary will be within the range Provincial 'A' Grade A.P.T. VII (£500-£580), with placing according to experience and qualifications.

The successful applicant will be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

A modern house will be available at moderate rent.

Applications, stating age, qualifications, training and experience, and giving the names of two referees, should be forwarded to the undersigned not later than December 15, 1951.

FRED. R. MITCHELL,
Group Manager.

County Gas Offices,
Uddingston,
Lanarkshire.
November 13, 1951.

### NORTH WESTERN GAS BOARD

FYLDE GROUP.

FIRST CLASS GAS FITTERS.

**APPLICATIONS are invited for the above** positions. Applicants should hold the City & Guild Technological Certificate in Gas Fitting. J.J.C. Schedule rates of pay. Applications to be addressed to: The General Manager, Fylde Group, North Western Gas Board, Princess Street, Blackpool, and received not later than December 8, 1951.

(*Classified advertisements continued on Supplement 4*)

## APPOINTMENTS VACANT *(ctd.)*

**DRAUGHTSMEN required by progressive gas** appliance and meter manufacturers for development work. Establishment is situated in London and candidates should forward full details of their qualifications, previous experience and salary required.—No. 9984, *Gas Journal*, 11 Bolt Court, Fleet Street, London, E.C.4.

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**EAST MIDLANDS GAS BOARD**

SHEFFIELD & ROTHERHAM DIVISION.

TECHNICAL ASSISTANT—

DONCASTER UNDERTAKING.

**APPLICATIONS are invited from suitably** qualified persons for the above-mentioned position.

Candidates should hold the Ordinary Grade Certificate in Gas Engineering (Manufacture) and should have had experience in Works operation.

The salary will be in accordance with A.P.T. Grade V, and the initial placing on the scale will be according to age and experience.

The post is superannuable and the successful applicant may be required to undertake a medical examination.

Applications, stating age, training, qualifications and experience, together with the names of two referees should be addressed and forwarded to the undersigned not later than December 14, 1951.

E. H. HARMAN,
Divisional General Manager.

East Midlands Gas Board,
Sheffield & Rotherham Division,
Commercial Street,
Sheffield, 1.
November 21, 1951.

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**EAST MIDLANDS GAS BOARD**

LEICESTER & NORTHANTS DIVISION.

LEICESTERSHIRE & RUTLAND
SUB-DIVISION.

SENIOR HOME SERVICE ADVISER.

**APPLICATIONS are invited for the position of** SENIOR HOME SERVICE ADVISER for the Leicestershire and Rutland Sub-Division. The duties will involve responsibility for organising the activities of the Home Service Section and for co-ordinating the work of the Home Service Advisers, based on the Leicester Undertaking, within the Sub-Division.

Candidates, who must hold a recognised diploma in cookery and domestic science and should have had practical experience in those subjects, must be capable of demonstrating and promoting the use of gas appliances, and in advising consumers on kitchen and other domestic problems involving the use of gas. The salary will be within the range £400/£464 per annum according to qualifications and experience.

The post is superannuable, and the successful candidate may be required to undergo a medical examination.

Applications stating age, qualifications and experience, and giving full particulars of training, together with the names of two referees, should be addressed to the undersigned to be received not later than December 8, 1951.

C. C. WOOD,
Divisional General Manager.

Millstone Lane,
Leicester.
November 13, 1951.

---

**EXPERIENCED FOREMEN required for Gas** Mainlaying Contracts in various parts of the country. Good rates of pay, hours, etc., to No. 9985, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

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**NORTH THAMES GAS BOARD**

**SENIOR DRAUGHTSMAN required, experienced** in the design and detailing of reinforced concrete structures and general civil engineering work.

The appointment is of a permanent nature and pension arrangements will be discussed with short list candidates.

Starting salary will be within the range of £650-£800 per annum, depending upon age, qualifications and experience.

Applications, giving age and full particulars, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, quoting reference number 91.

---

**CHEMIST to undertake field investigation on** Chemical Engineering plant mainly associated with Gas Works. Must be able to work out test procedure and design apparatus on own initiative and obtain reliable data as required by Research and Development department of old established firm in Manchester district.

Applicant must possess suitable technical qualifications, enterprise and drive necessary to overcome site difficulties and restrictions. The post will entail travelling and temporary absence from the Works. A fully equipped laboratory is available for development of work commenced in the field and for routine investigation of chemical engineering principles. Pension scheme. Fullest details of experience, with references, together with age and salary required to No. 9983, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

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**WEST MIDLANDS GAS BOARD**

WARWICKSHIRE DIVISION.

HINCKLEY DISTRICT.

PRODUCTION ENGINEER.

**APPLICATIONS are invited from suitably** qualified persons for the above position at Hinckley Gas Works.

Candidates should possess the Institution of Gas Engineers Higher Grade Certificate in Gas Engineering (Manufacture). They should have had considerable carbonising experience, preferably with Woodall-Duckham Continuous Plant, and be fully conversant with the normal production procedure, including all maintenance necessary for a 500 million Works, and capable of controlling all labour.

The commencing salary will be not less than £570 per annum, rising by annual increments to a maximum of £670 per annum, in accordance with Grade IX of the salary scales of the National Joint Council for Gas Staffs.

The appointment will be subject to such Superannuation Regulations as the Board may, in due course, adopt, and the successful candidate may be required to pass a medical examination.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be addressed to: Mr. A. Allen, Divisional Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

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2 EXTRACTOR BODIES.
7 BOTTOM MOUTH PIECES (complete with doors).
4 TOP MOUTH PIECES.
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2 EXTRACTOR shafts.
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Further details may be obtained from H. B. Kendrick, M.Inst. Gas E., Engineer and Manager, Old Municipal Buildings, Castle Street, Conway.

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**FOR SALE:** 26 kW. "Tangye" DIESEL GENERATING SET 220 v. D.C. "Cochran" Oil Fired Boiler 16 ft. 6 in. × 7 ft., 100 w.p. Two—R.S. OPEN TOP TANKS 12 ft. 6 in. deep × 8 ft. × 8 ft. 20 h.p. Diesel Loco., 24 in. gauge. CENTRIFUGAL PUMP by "Pulsometer" 200 g.p.m. 43 ft. hd.—400/3/50, many others. Geared COKE CRUSHER—Toothed roll 13 in. × 7½ in. with screen. Two—STEEL SECTIONAL TANKS, 8 ft. × 8 ft. × 4 ft. deep.

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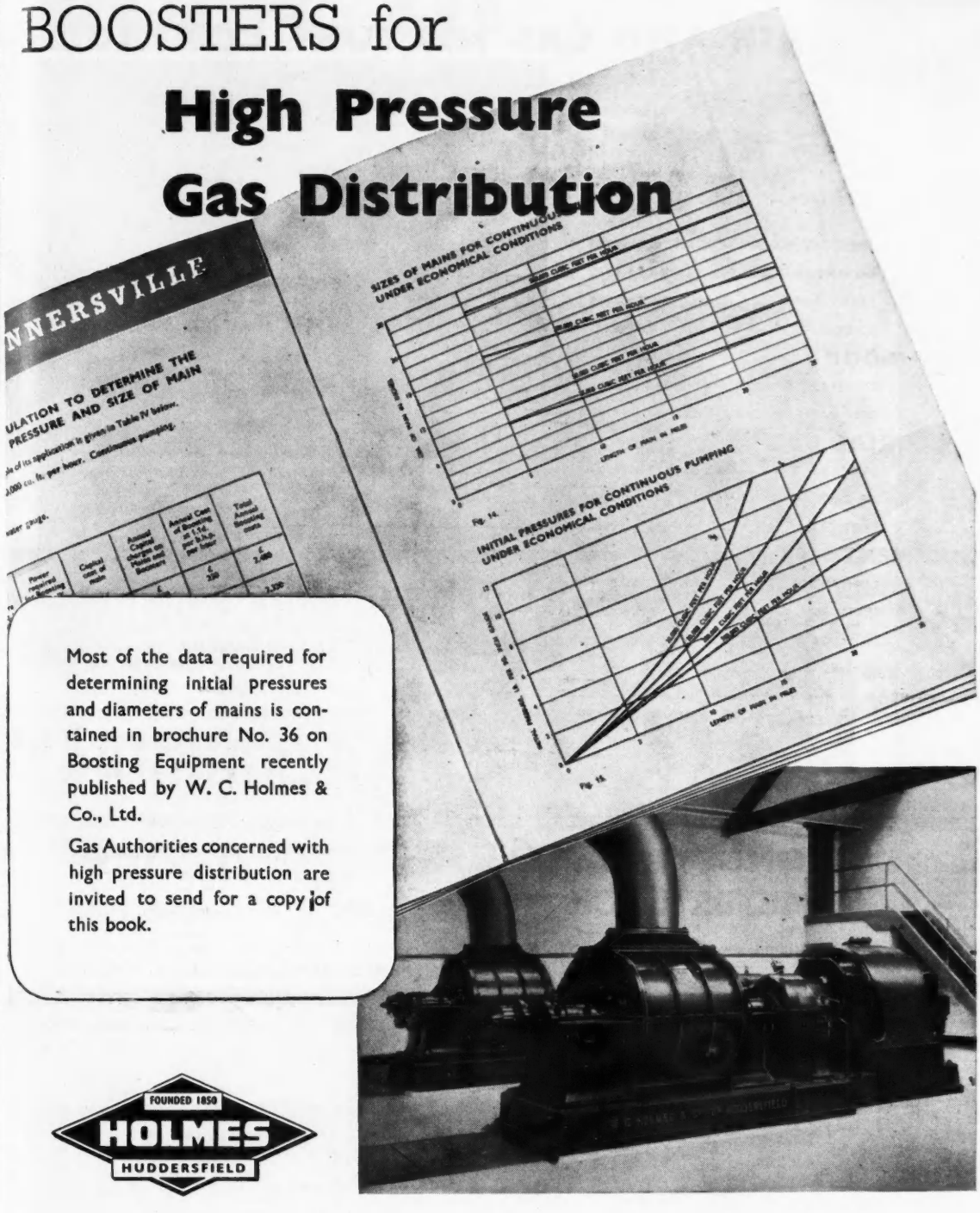
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ULATION TO DETERMINE THE PRESSURE AND SIZE OF MAIN
SIZES OF MAINS FOR CONTINUOUS UNDER ECONOMICAL CONDITIONS
INITIAL PRESSURES FOR CONTINUOUS PUMPING UNDER ECONOMICAL CONDITIONS

Most of the data required for determining initial pressures and diameters of mains is contained in brochure No. 36 on Boosting Equipment recently published by W. C. Holmes & Co., Ltd.

Gas Authorities concerned with high pressure distribution are invited to send for a copy of this book.



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"Tornado"

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INJECTORS BURNER NOZZLES BLOWPIPES RADIANT DISC BURNERS LAUNDRY AND TAILOR IRONS SOLDERING IRONS SOLDERING STOVES SMALL FURNACES

**"TORNADO"** AIR AND GAS MIXTURE CONTROLLERS SAFETY CUT-OFF SWITCH (ALSO USED AS METER PROTECTION VALVE AND

**INDUSTRIAL GAS** AIR FLOW SWITCH) SAFETY SHUT-OFF VALVES NON-RETURN OR BACK PRESSURE VALVES METER PROTECTION VALVES (BY-PASS TYPE)

**EQUIPMENT** RELAY THERMOSTATS THERMOSTAT CONTROLLERS DIRECT ACTING THERMOSTATS SERVICE GOVERNORS AIR FLOW SWITCHES COMPRESSORS GAS FIRED UNIT HEATERS GAS BOOSTERS AIR BLOWERS

**FOR CONTROLLING THE QUALITY OF AIR/GAS MIXTURE** *irrespective of varying pressures and resistances. Temperature control is varied by manipulation of the air cock only.*
**CAPACITY RANGE:** *from 130 to 1,380 cub. ft. of gas per hour according to air pressure (¼ lb. to 1 lb.) and size. For low pressure gas systems.*
**AIR INLETS:** *1", 1¼", 1½" and 2" dias. gas thread.*

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430/1/GJ

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- **DO** remember that good quality is cheapest in the long run
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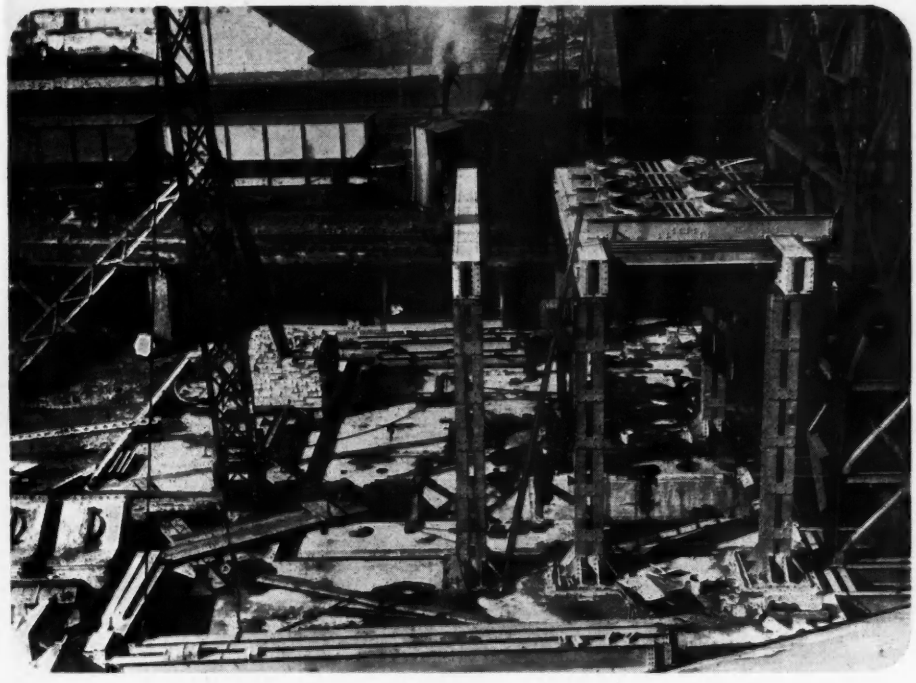

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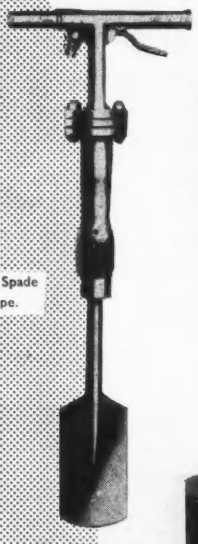

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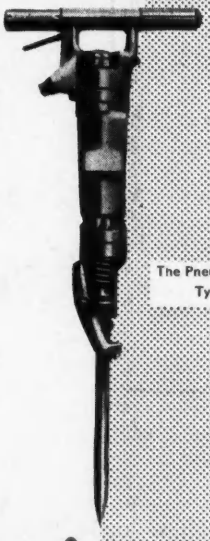

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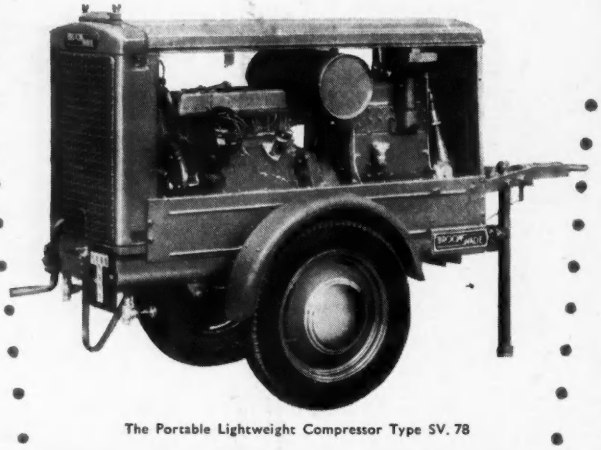

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